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SCIENCE
TECHNOLOGY
ENGINEERING
APPROVED

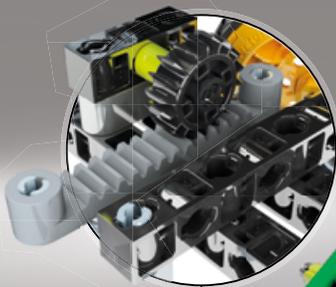
MECHANICS

Laboratory

FARM EQUIPMENT

Models 1 to 6

- 1 - The tractor with a hot-bulb engine
- 2 - The Tractor
- 3 - Farm equipment: the haymaker
- 4 - Farm equipment: the irrigator
- 5 - The grape harvester
- 6 - The tomato harvester



V36959

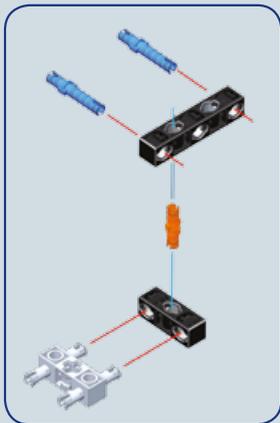
Read and keep this booklet for future reference.

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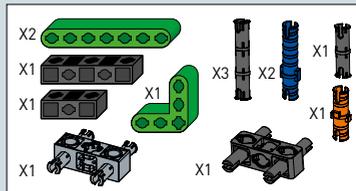
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1 THE TRACTOR WITH A HOT-BULB ENGINE



1

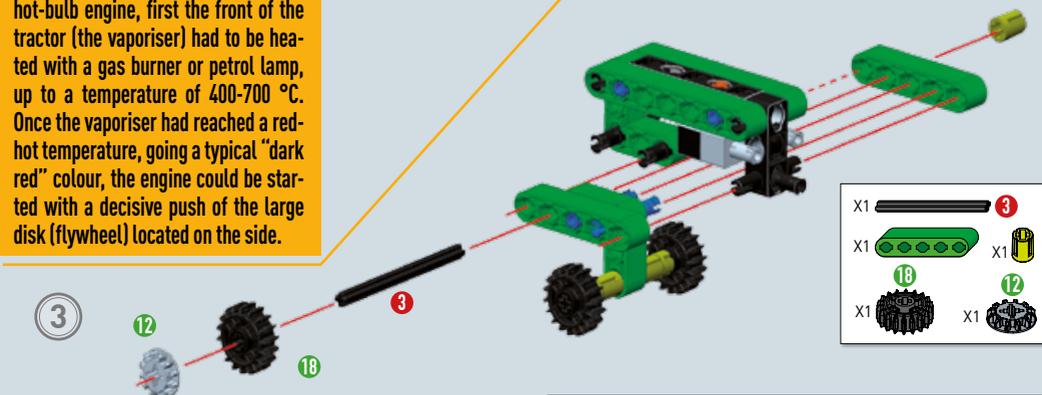
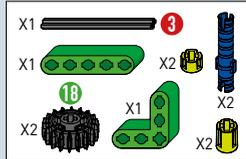
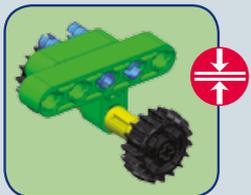


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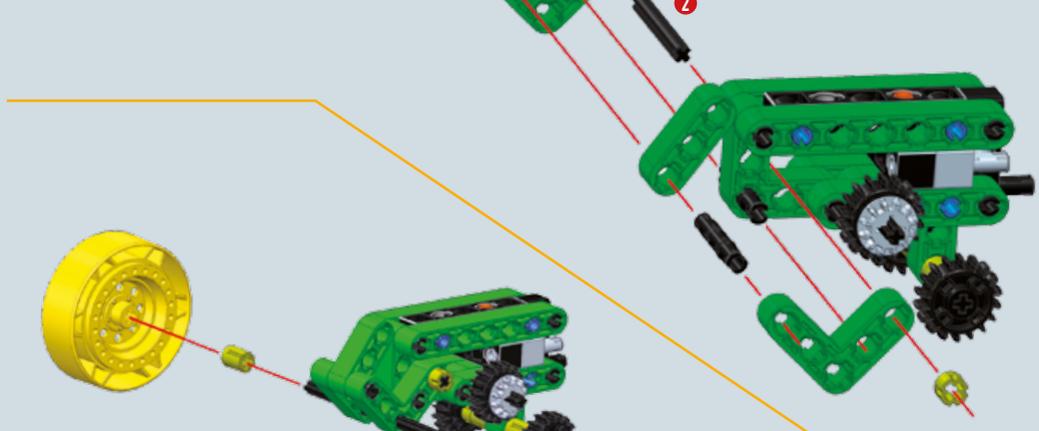
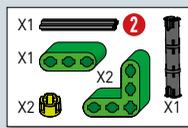
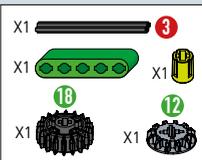


Technical facts and curiosities

The first hot-bulb engines were built at the end of the 19th century and remained in widespread use until the middle of the 20th century. To start a hot-bulb engine, first the front of the tractor (the vaporiser) had to be heated with a gas burner or petrol lamp, up to a temperature of 400-700 °C. Once the vaporiser had reached a red-hot temperature, going a typical "dark red" colour, the engine could be started with a decisive push of the large disk (flywheel) located on the side.



3



4

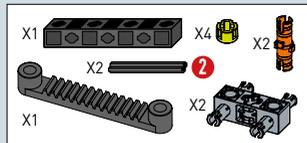


Final assembled model

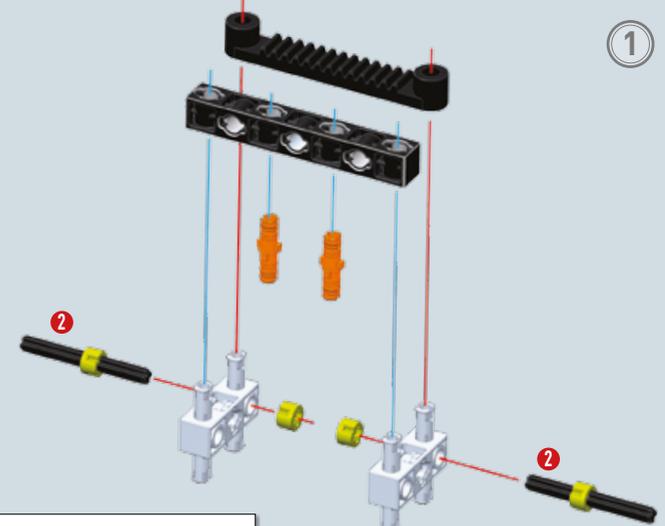


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2 THE TRACTOR

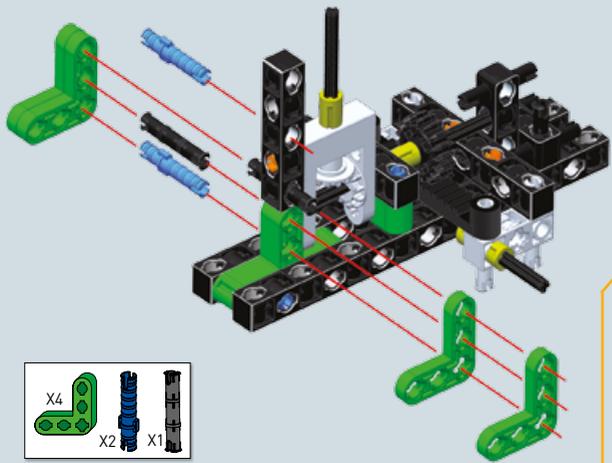


Technical facts and curiosities
A tractor is a machine able to develop power in order to tow or operate farm equipment that is connected to it.

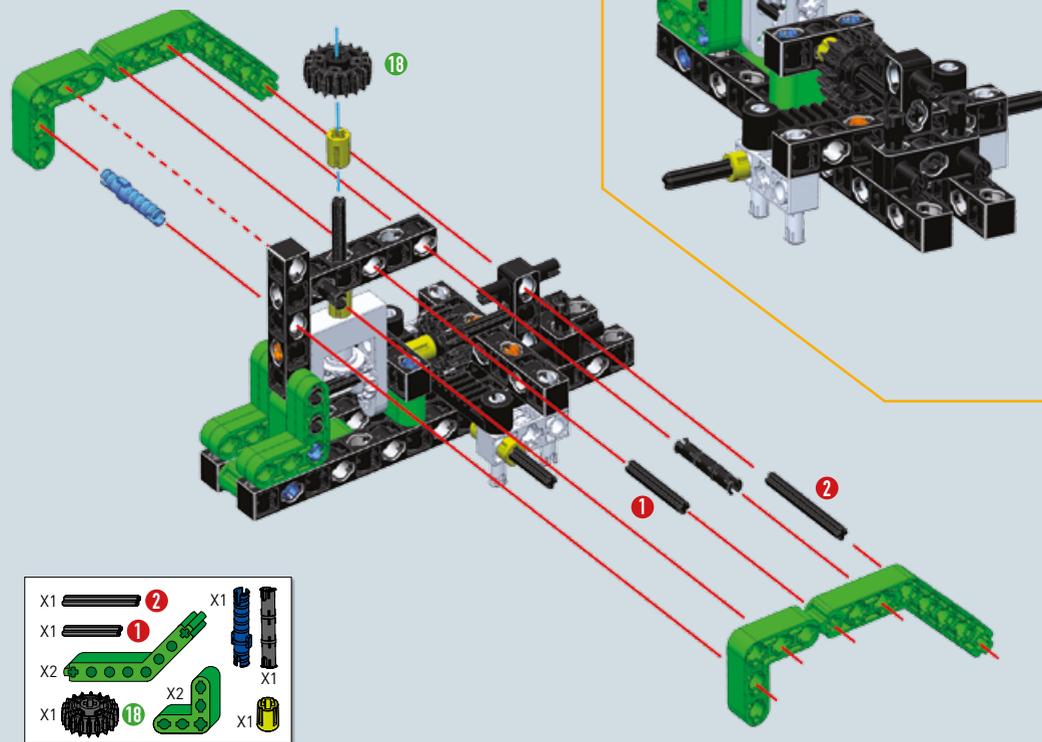


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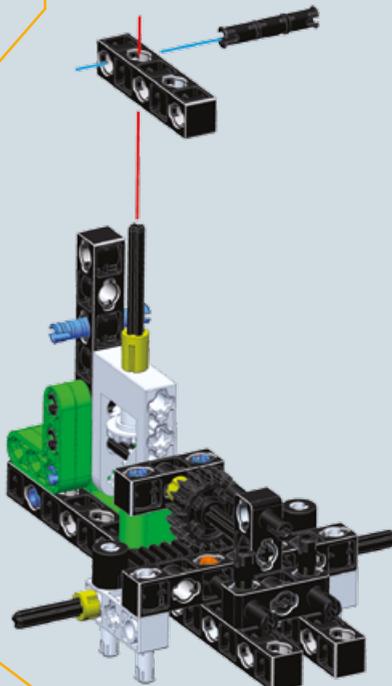
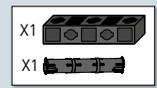
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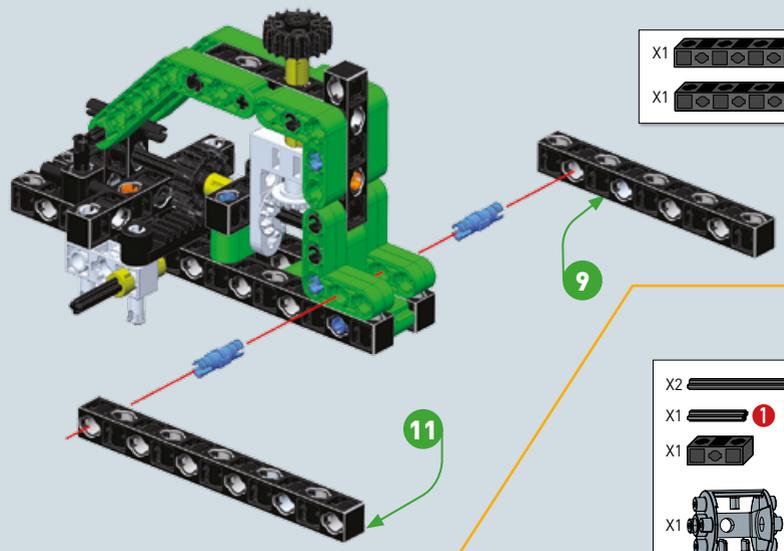
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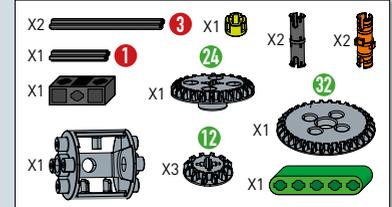
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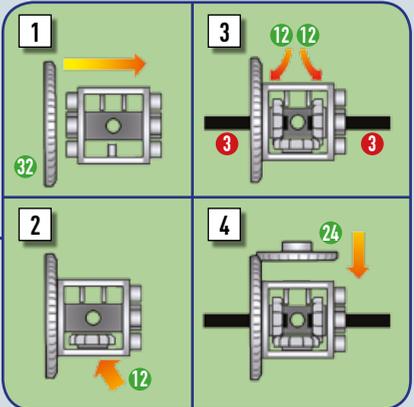
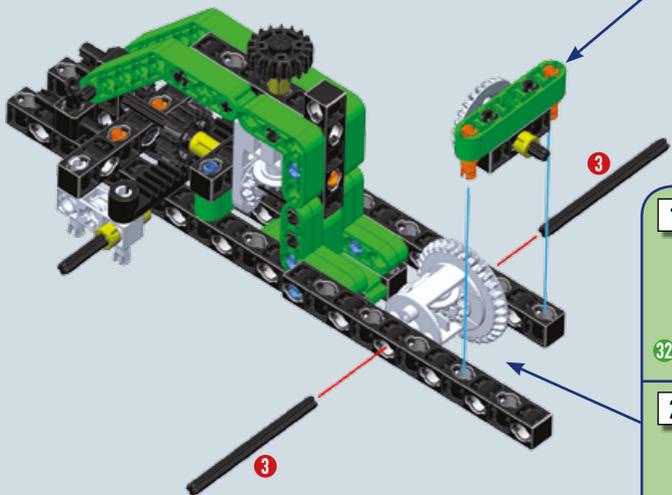
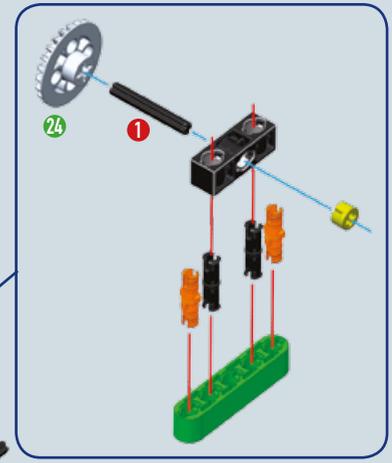


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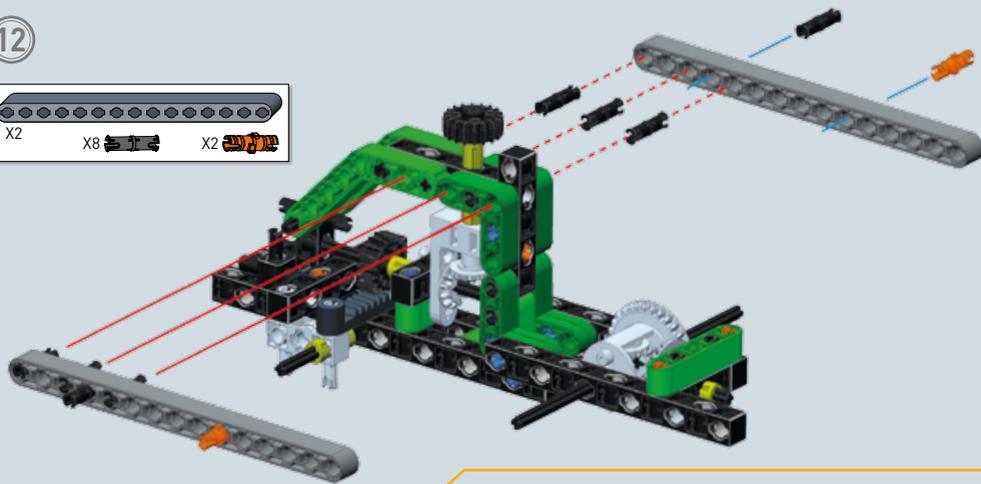
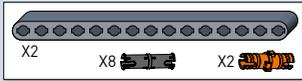


Technical facts and curiosities

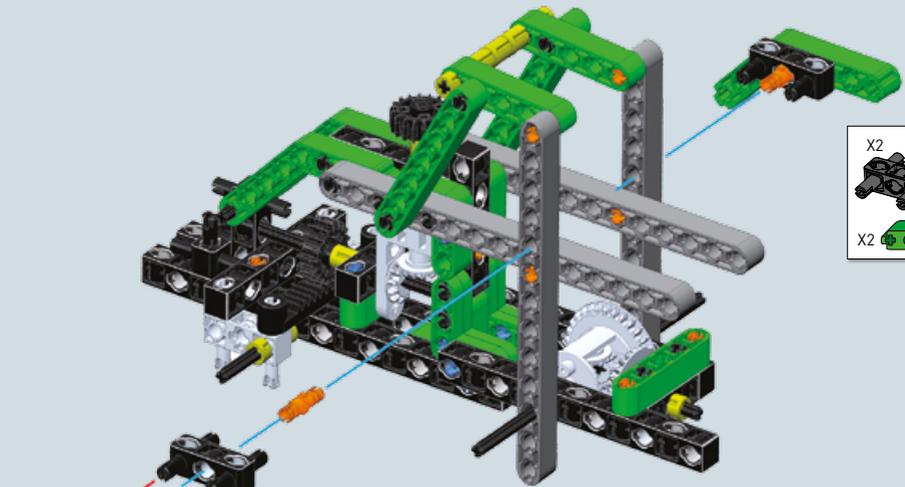
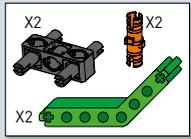
The engine drives the tractor's driving wheels by means of the differential, but at the same time, the engine's power can be transferred to the power take-off by means of a system of gears and reduction gears directly connected to the drive shaft.



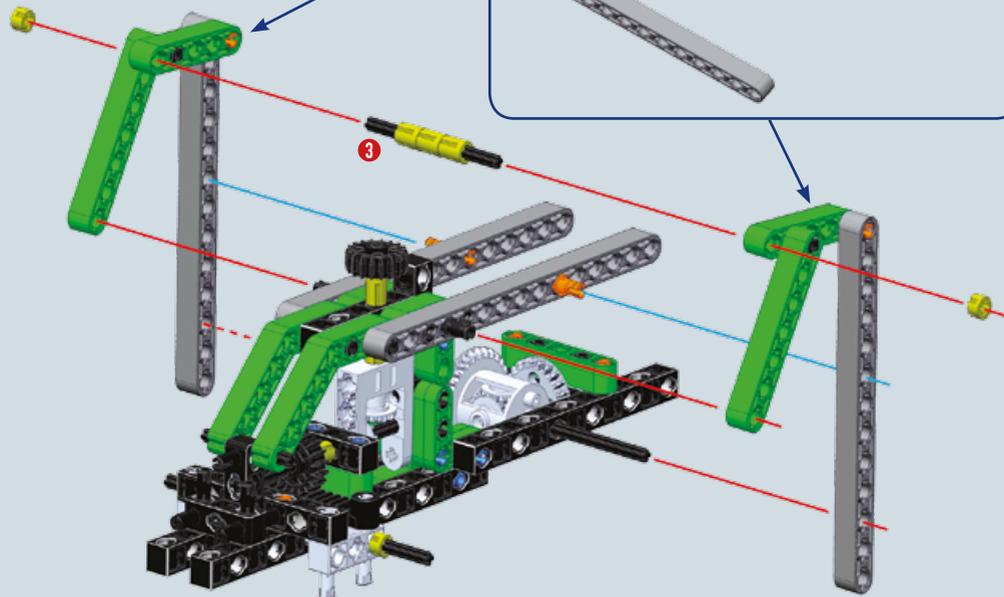
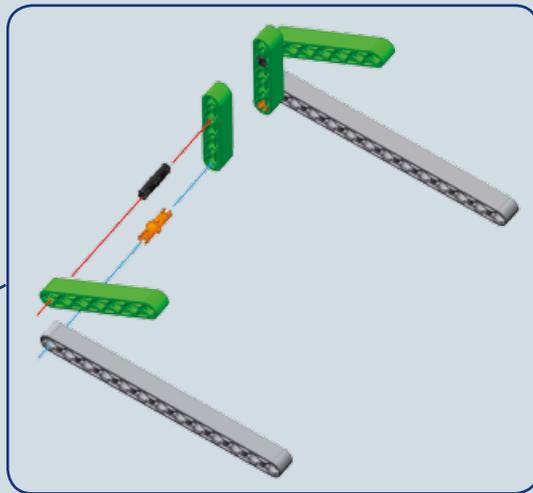
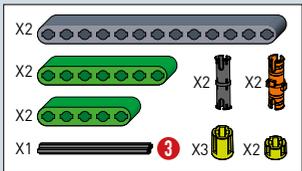
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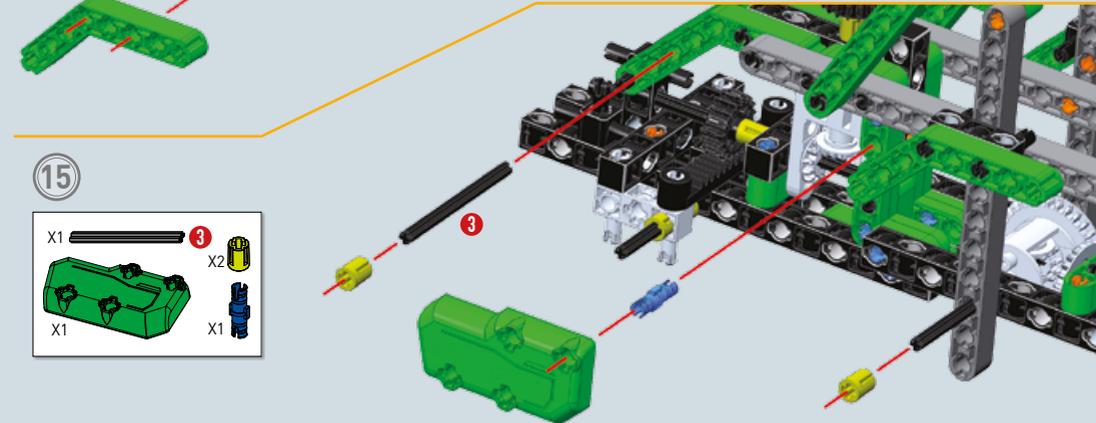
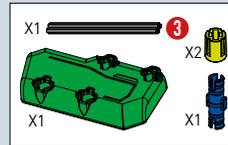
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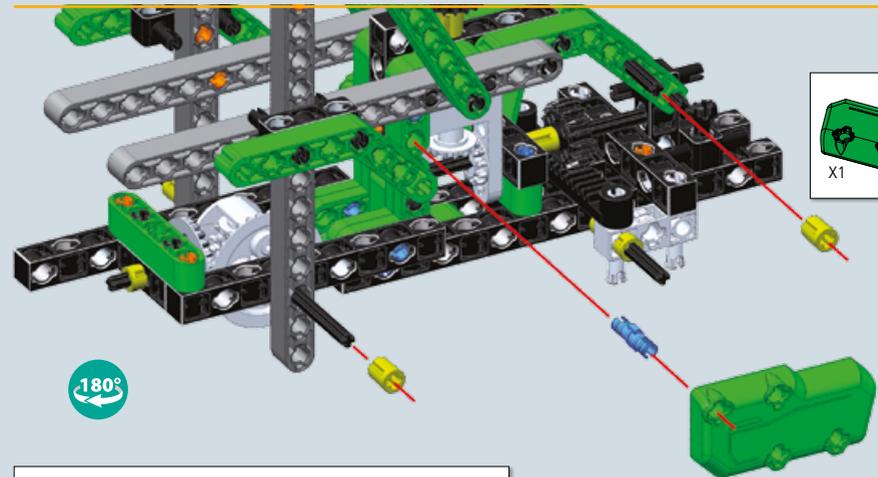
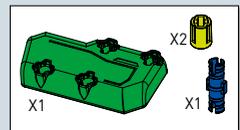
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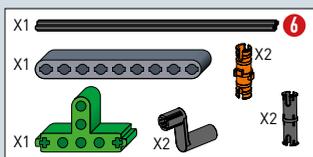
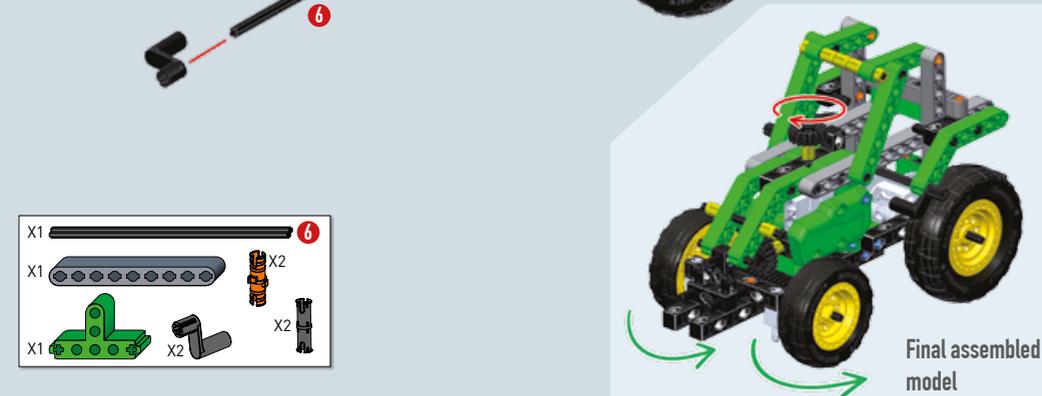
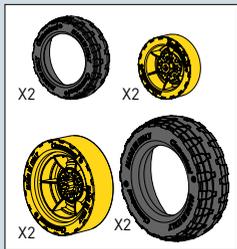
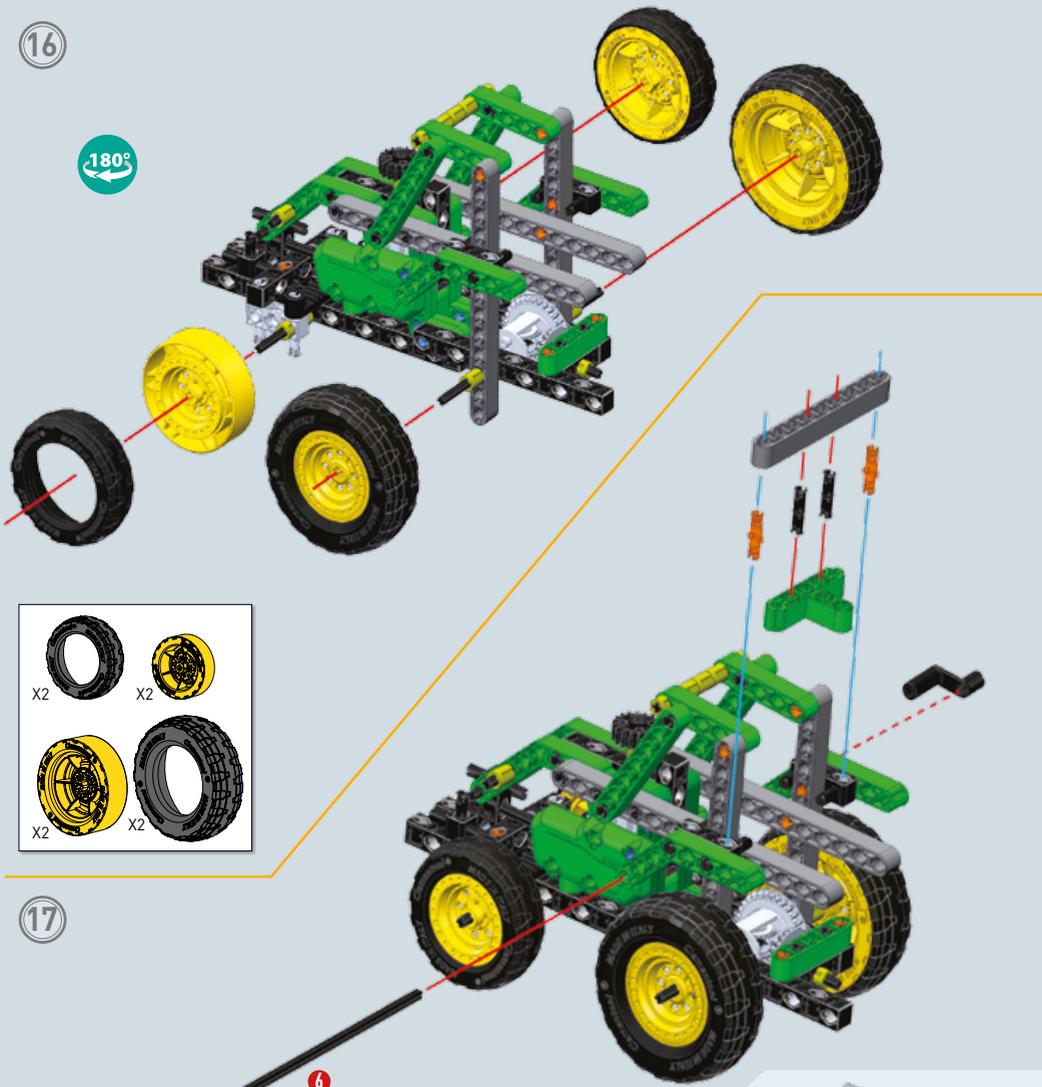


16



180°





THE DIFFERENTIAL

Technical and scientific analysis

The differential is a mechanical device able to transfer the power developed by the engine to the drive wheels.

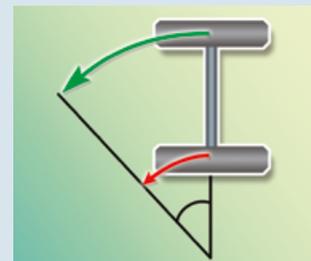


- 1 - Pinion gear: transfers power from the engine to the ring gear and ultimately the driving wheels.
- 2 - Ring gear: attached to the differential cage and permanently engaged with the pinion gear.
- 3 - Differential cage: box that houses the gears.
- 4 - Spider gears: gears attached to the cage.
- 5 - Side gears: gears attached to the axle shafts
- 6 - Axle shafts: axles that connect the driving wheels to the side gears.

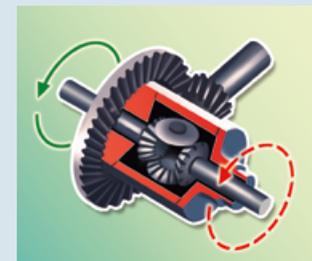
It is designed to allow the two wheels to rotate at different speeds when going round a bend. On non-straight sections, the outside wheel covers more road than the inside wheel. Therefore the outside wheel has to rotate faster.



The pinion gear transfers the engine's power to the differential and, as a result, to the axle shafts, turning the wheels.

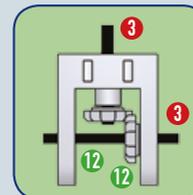
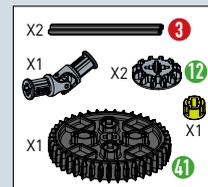
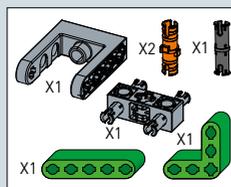
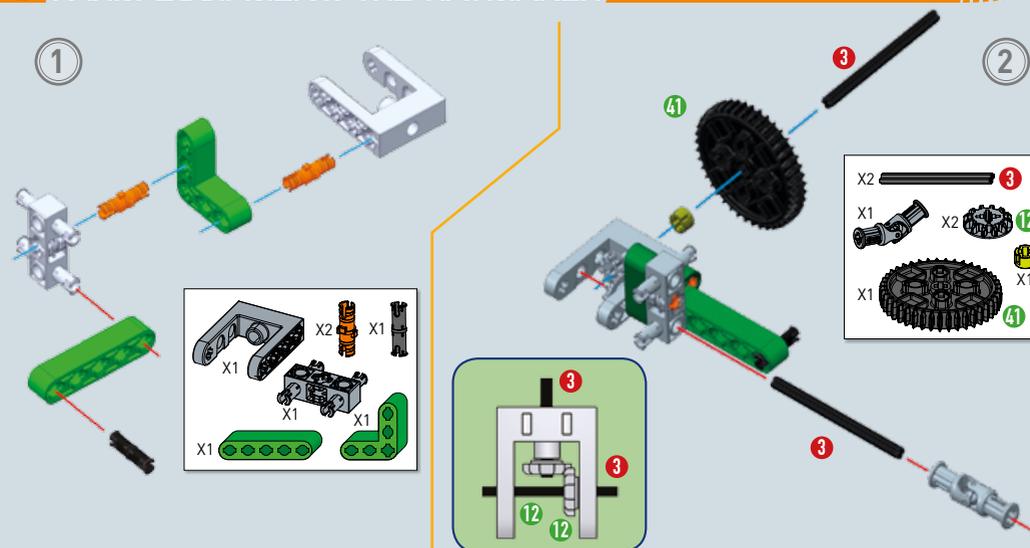


When going round a bend, the inside wheel covers less distance than the outside wheel.



The differential allows a vehicle's wheels to rotate at different speeds when going round a bend.

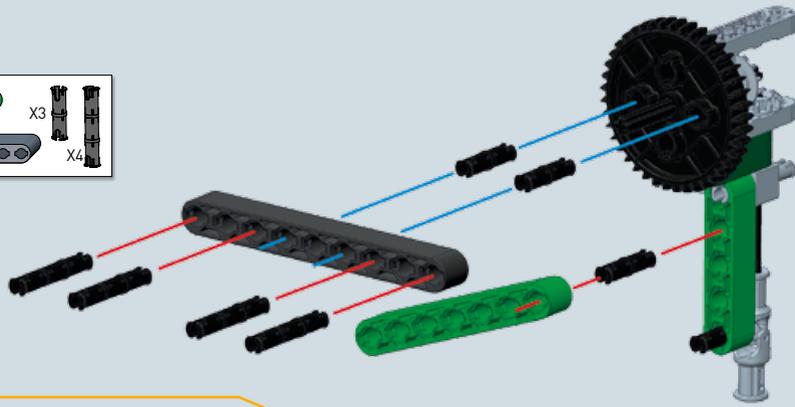
3 FARM EQUIPMENT: THE HAYMAKER



To assemble the universal joint, follow the instructions printed on the warnings leaflet, contained in the box.

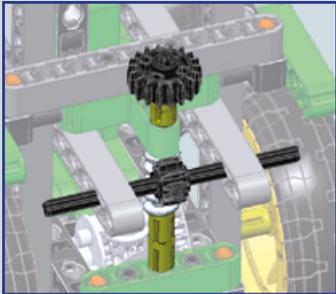
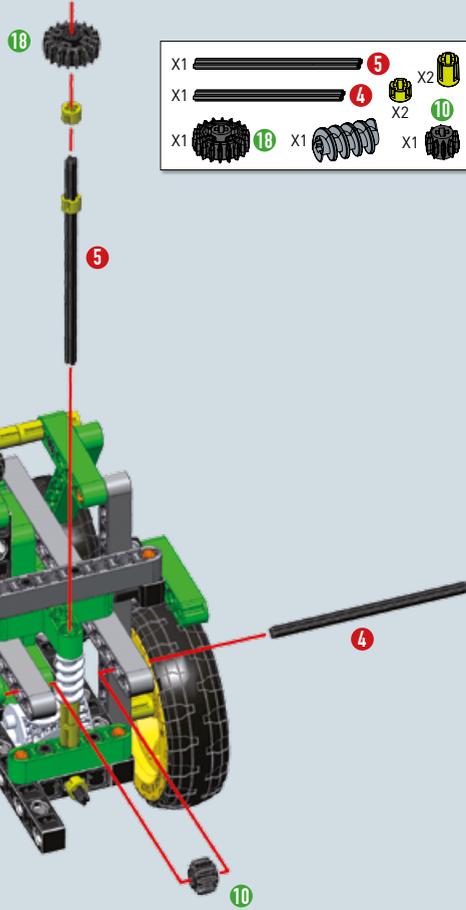
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- X1
- X1
- X3
- X4



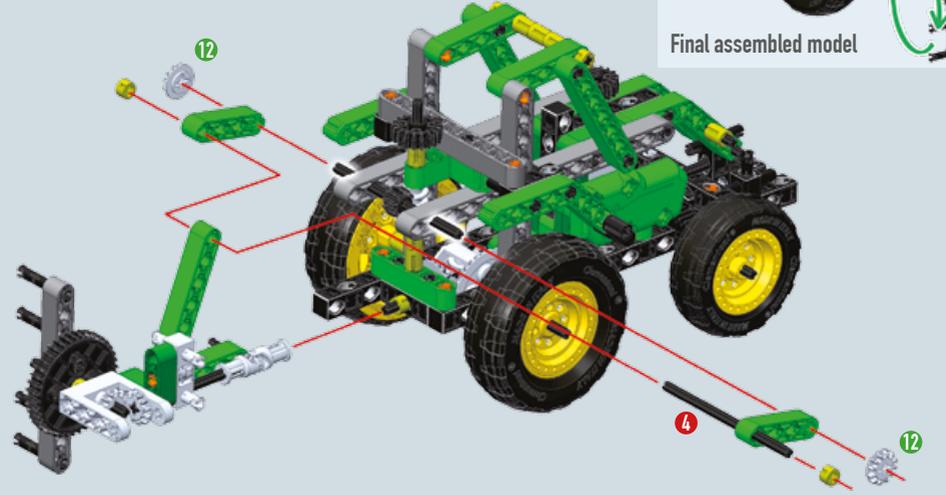
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- X1
- X1
- X1
- X1
- X2
- X2
- X2
- X2



5

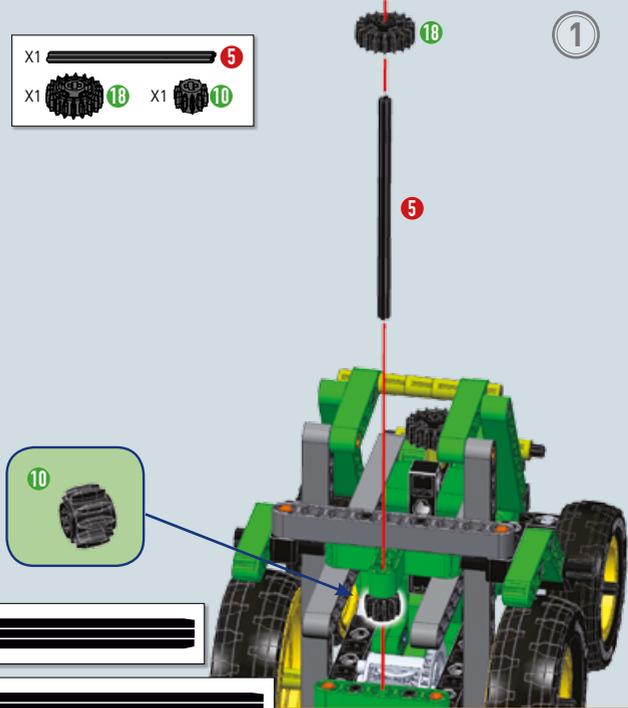
- X1
- X2
- X2
- X2

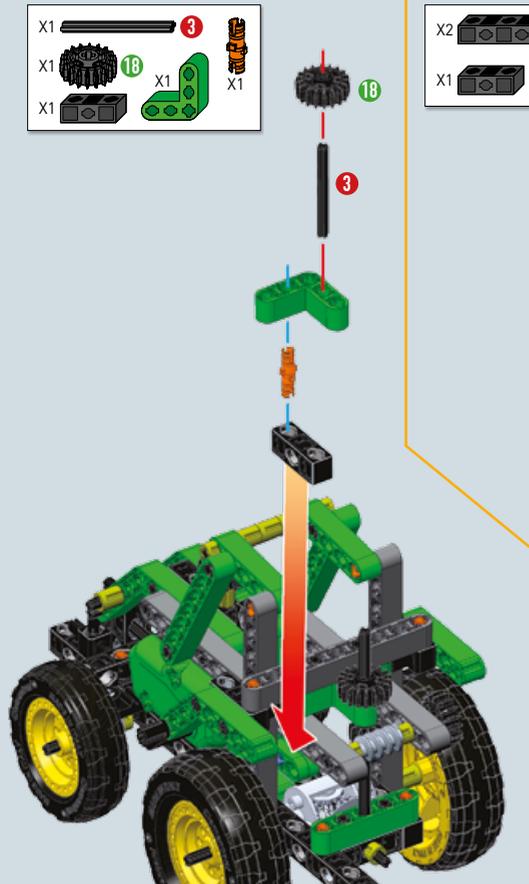
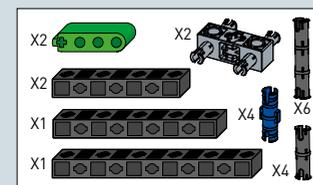
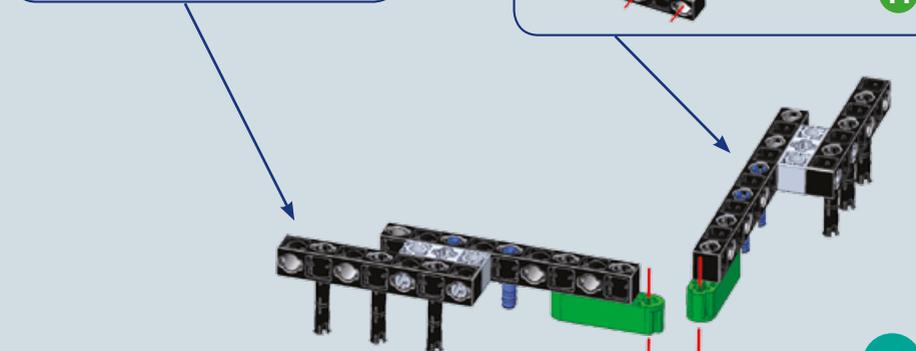
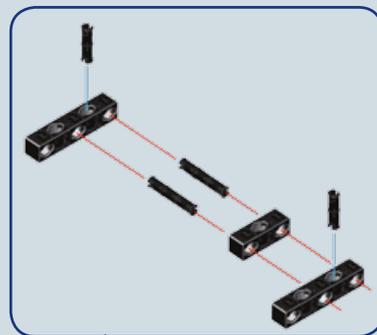
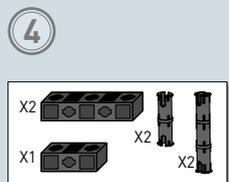
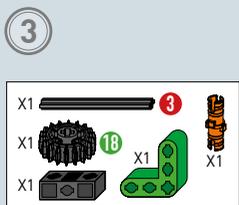
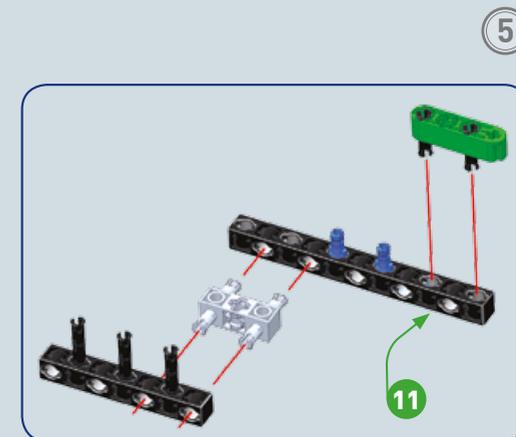
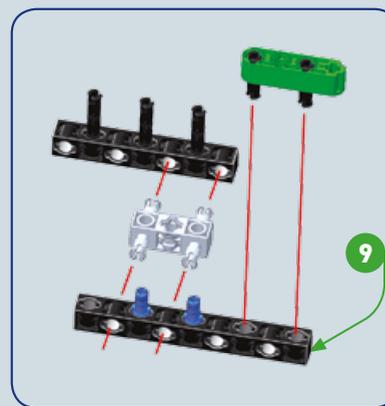


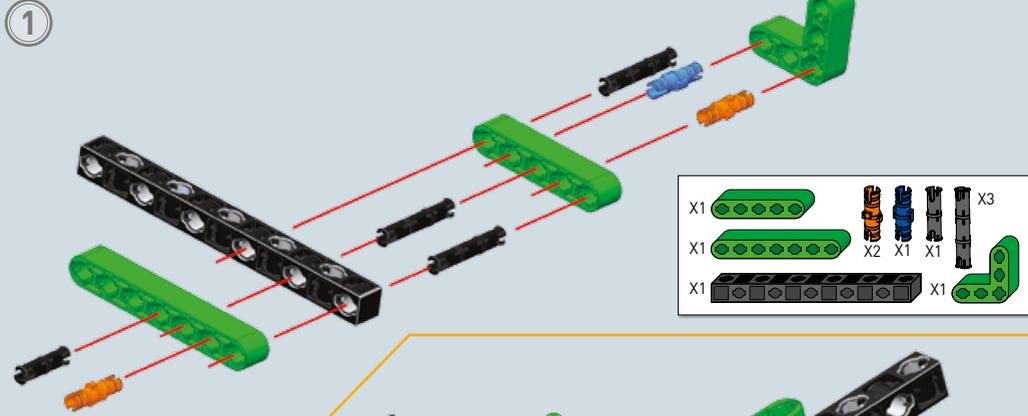
4 FARM EQUIPMENT: THE IRRIGATOR



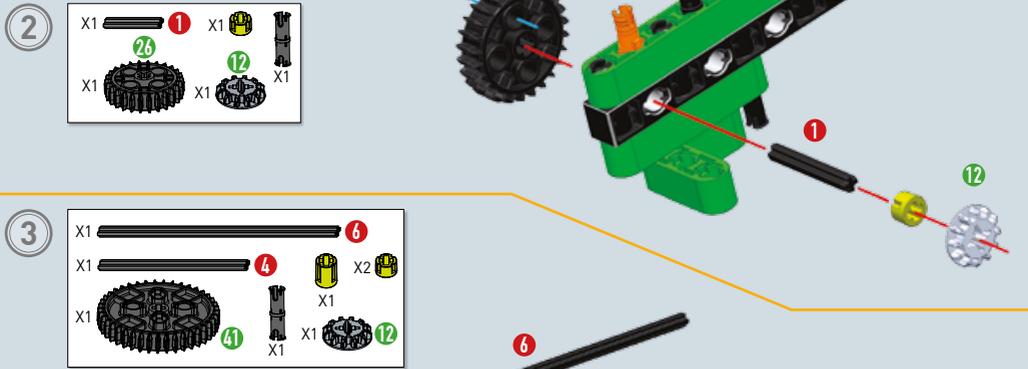
- X1
- X1
- X1



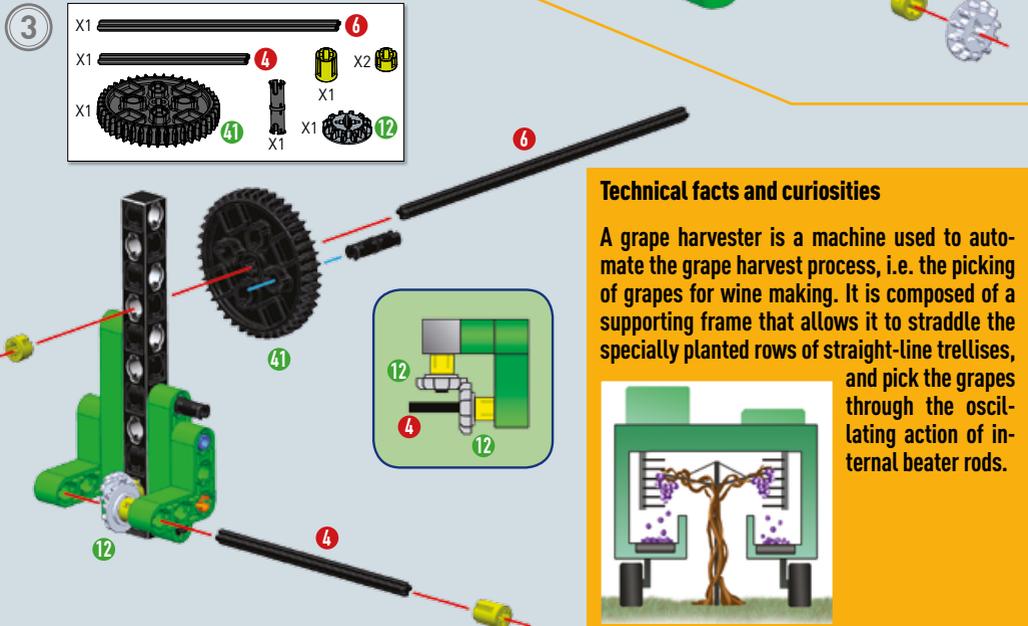




- X1 [Green Technic Beam 1x6]
- X1 [Green Technic Beam 1x6]
- X1 [Black Technic Beam 1x6]
- X2 [Black Pin Long]
- X1 [Blue Pin Long]
- X1 [Black Pin Short]
- X3 [Black Pin Long]
- X1 [Green Technic Beam 1x3]



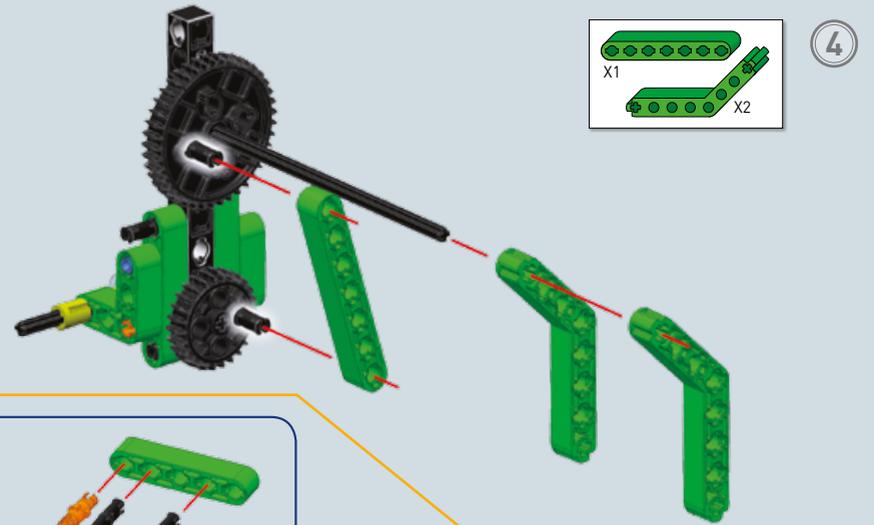
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- X1 [Yellow Pin Long]
- X1 [Black Pin Short]
- X1 [Black Gear 24]
- X1 [Black Gear 12]
- X1 [Black Pin Long]



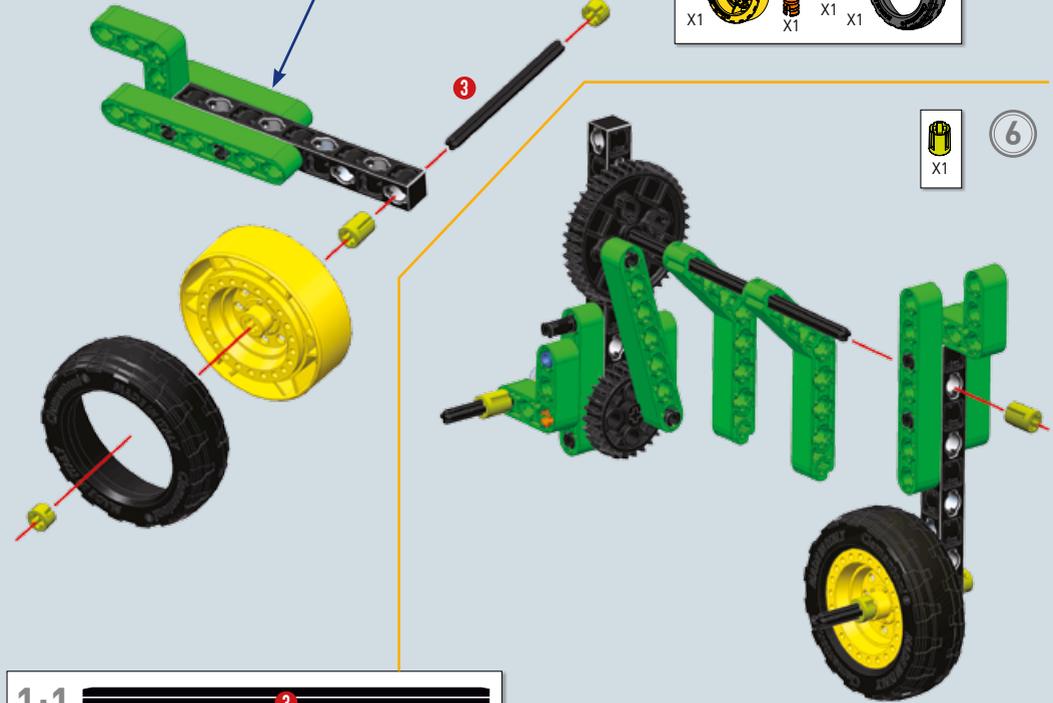
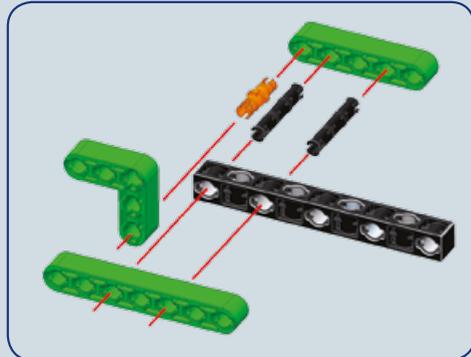
- X1 [Black Pin Long]
- X1 [Black Pin Long]
- X1 [Black Gear 24]
- X1 [Black Pin Long]
- X1 [Black Gear 12]
- X2 [Yellow Pin Long]
- X1 [Black Pin Short]
- X1 [Black Gear 12]

Technical facts and curiosities

A grape harvester is a machine used to automate the grape harvest process, i.e. the picking of grapes for wine making. It is composed of a supporting frame that allows it to straddle the specially planted rows of straight-line trellises, and pick the grapes through the oscillating action of internal beater rods.



- X1 [Green Technic Beam 1x6]
- X2 [Green Technic Beam 1x6]

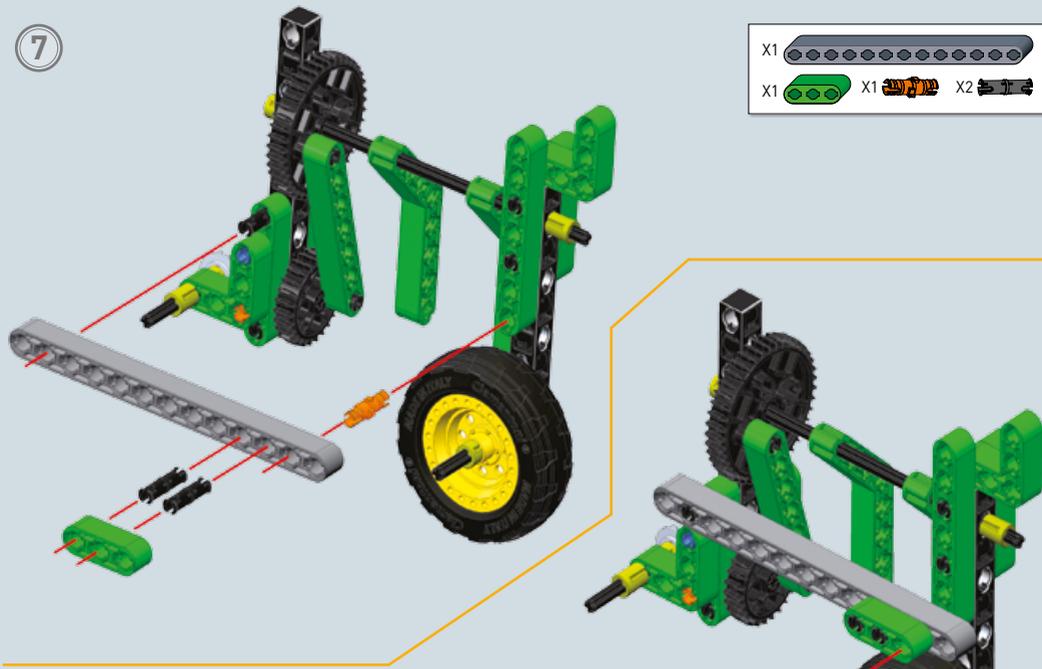


- X1 [Green Technic Beam 1x6]
- X1 [Green Technic Beam 1x6]
- X1 [Black Technic Beam 1x6]
- X1 [Black Pin Long]
- X1 [Black Gear 24]
- X1 [Black Gear 12]
- X2 [Yellow Pin Long]
- X2 [Black Tire]
- X1 [Black Pin Long]
- X1 [Black Pin Long]
- X1 [Black Pin Long]

- X1 [Yellow Pin Long]



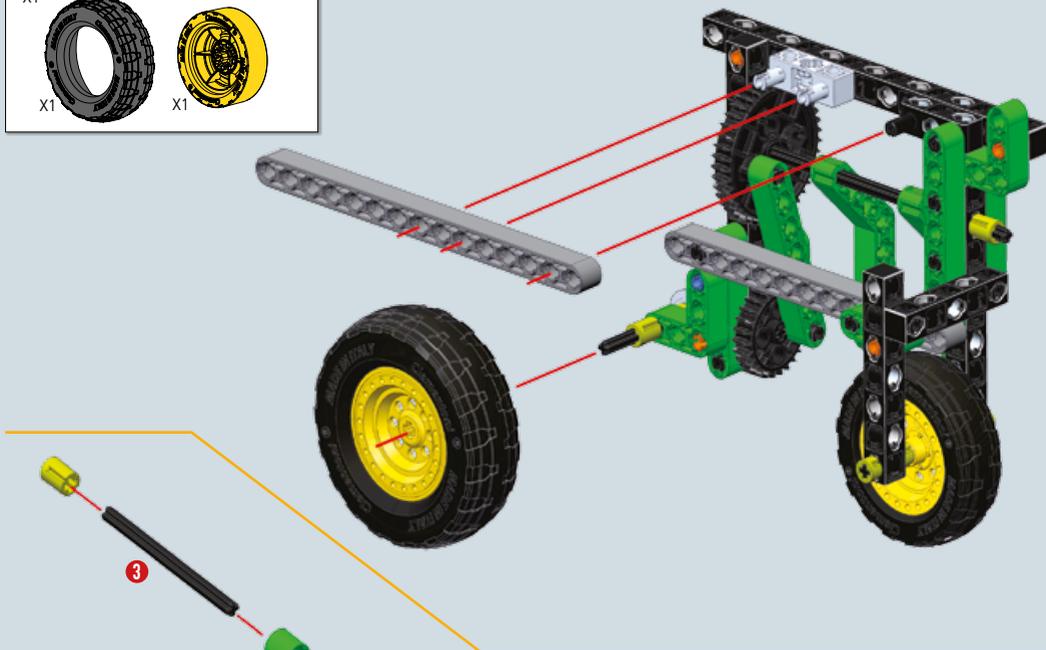
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- X1
- X1
- X1
- X2

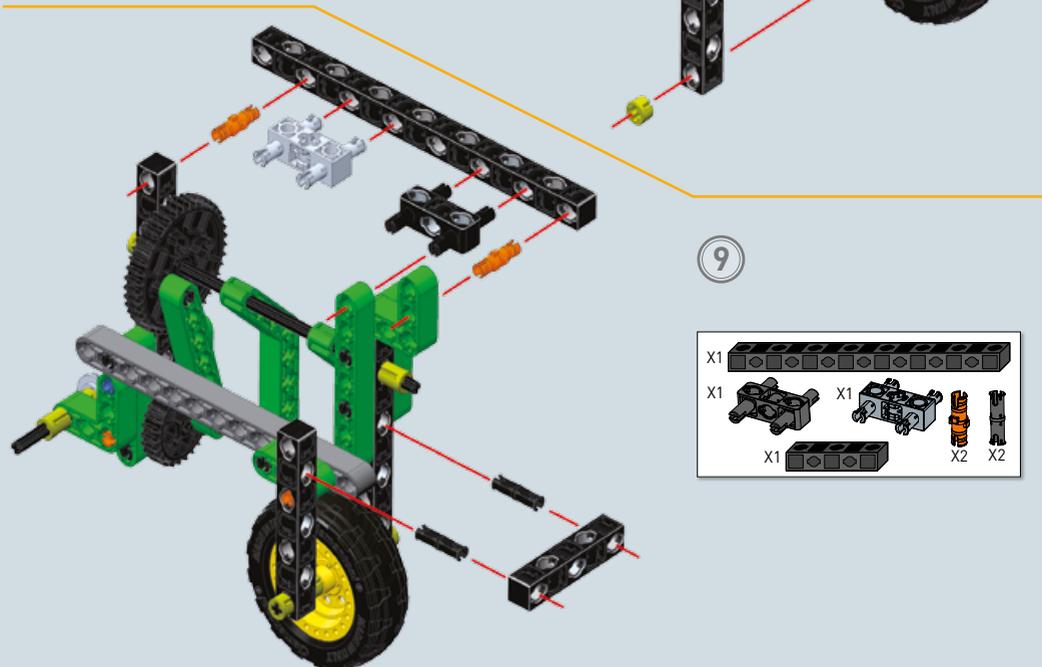
- X1
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- X1

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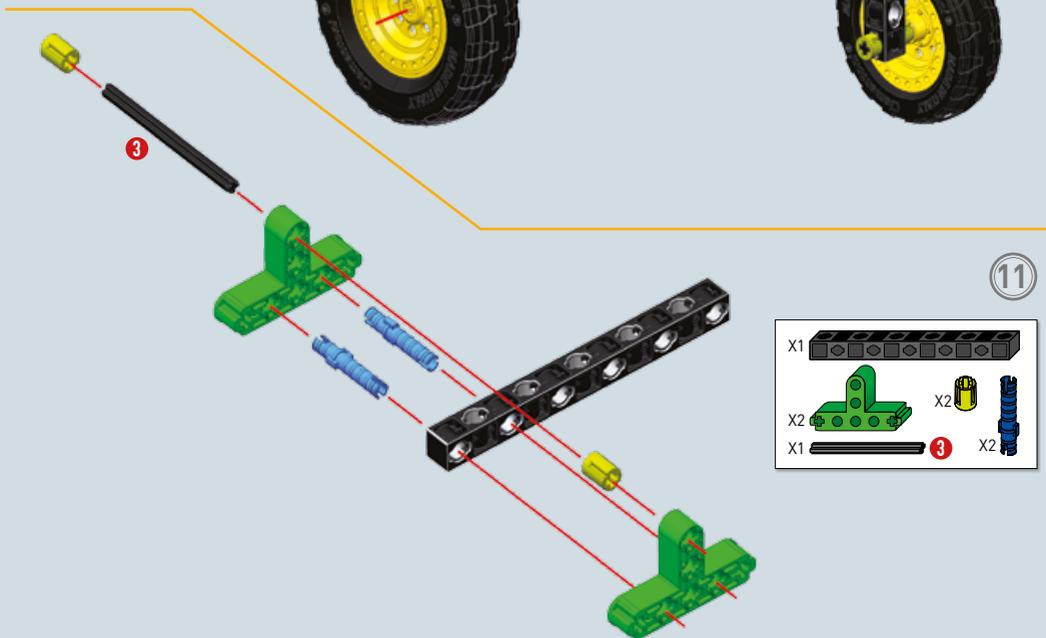
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- X1
- X1
- X1



9

- X1
- X1
- X1
- X1
- X2
- X2

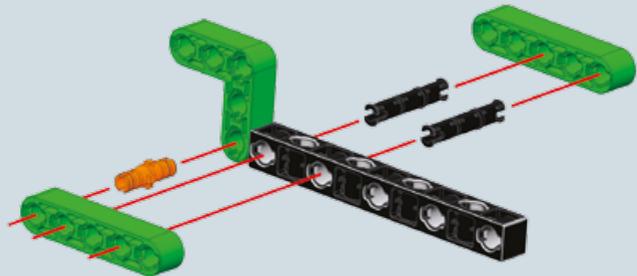


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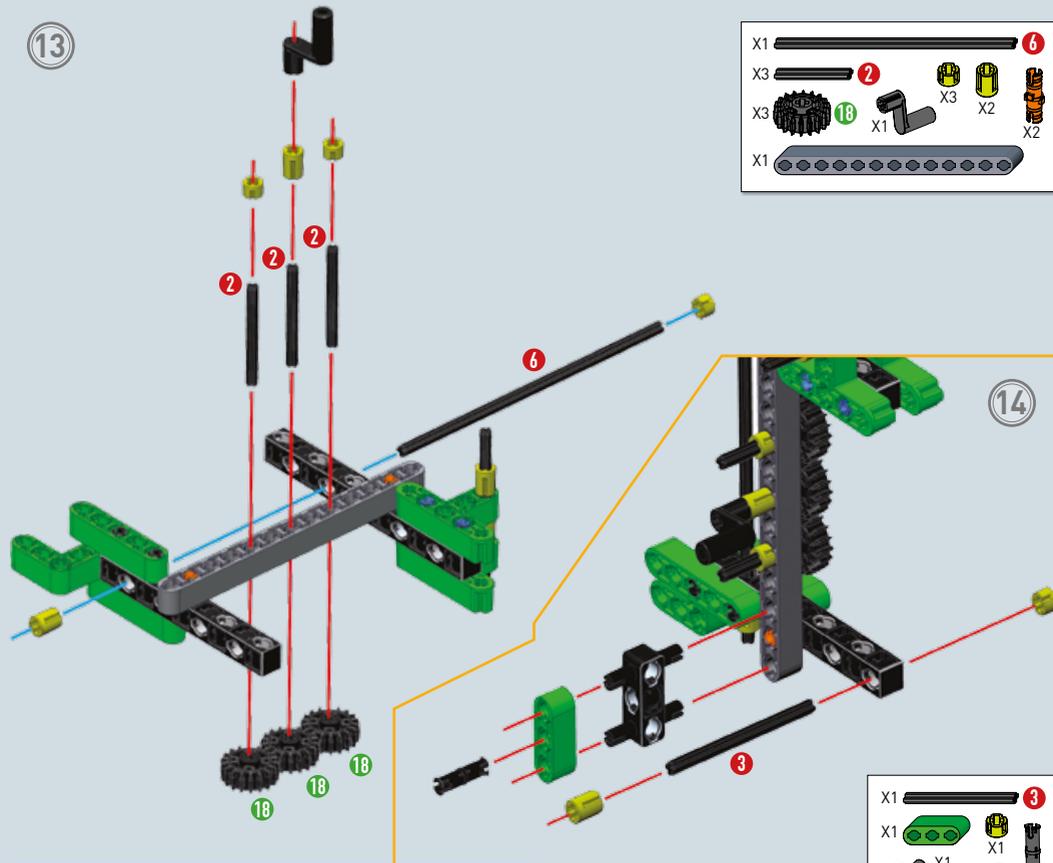
- X1
- X2
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- X1
- X2
- X1
- X2

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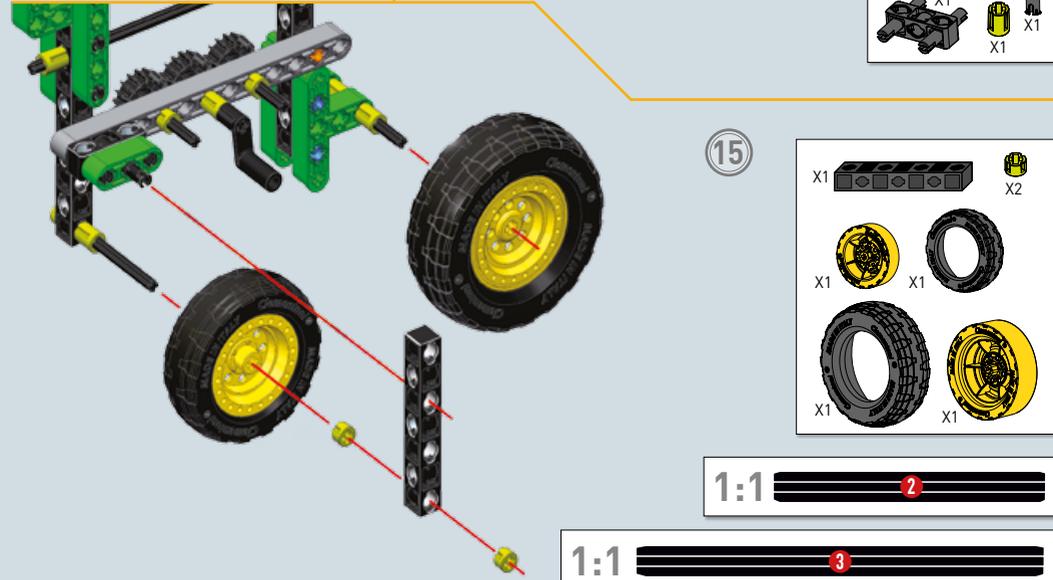


13



- X1 [Black Technic Beam 1x12]
- X3 [Black Technic Pin]
- X3 [Black Technic Gear 18]
- X1 [Black Technic Pin]
- X3 [Black Technic Pin]
- X2 [Black Technic Pin]
- X2 [Black Technic Pin]
- X1 [Black Technic Pin]

14



- X1 [Black Technic Pin]

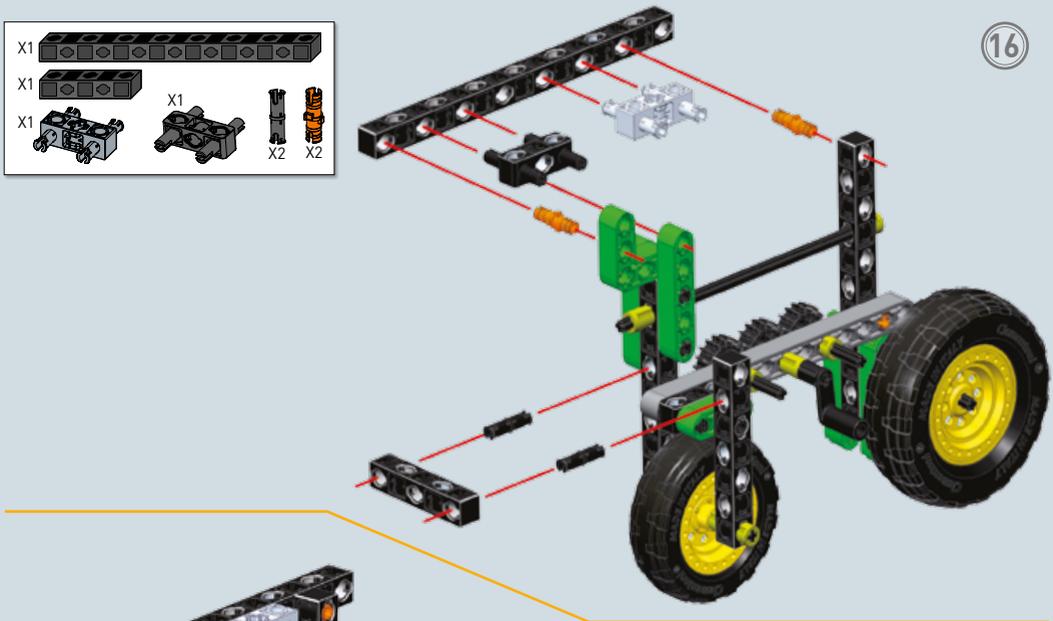
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- X1 [Black Technic Beam 1x12]
- X2 [Black Technic Pin]
- X1 [Black Technic Wheel 1.5]

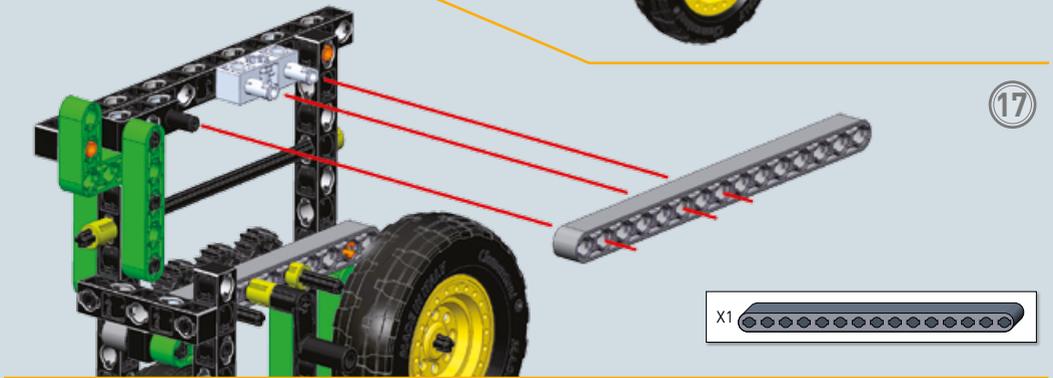


- X1 [Black Technic Beam 1x12]
- X1 [Black Technic Beam 1x12]
- X1 [Black Technic Beam 1x12]
- X1 [Black Technic Pin]
- X2 [Black Technic Pin]
- X2 [Black Technic Pin]

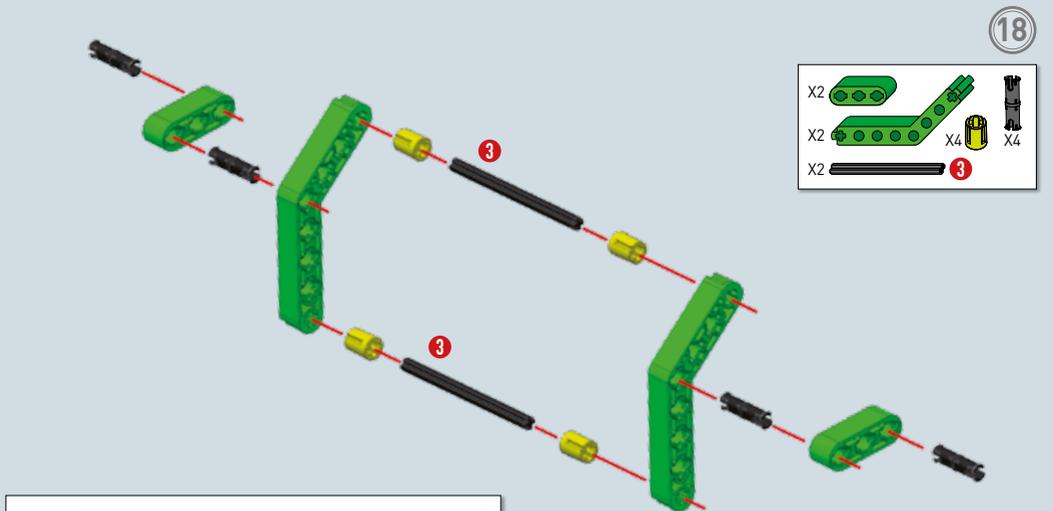
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17



18



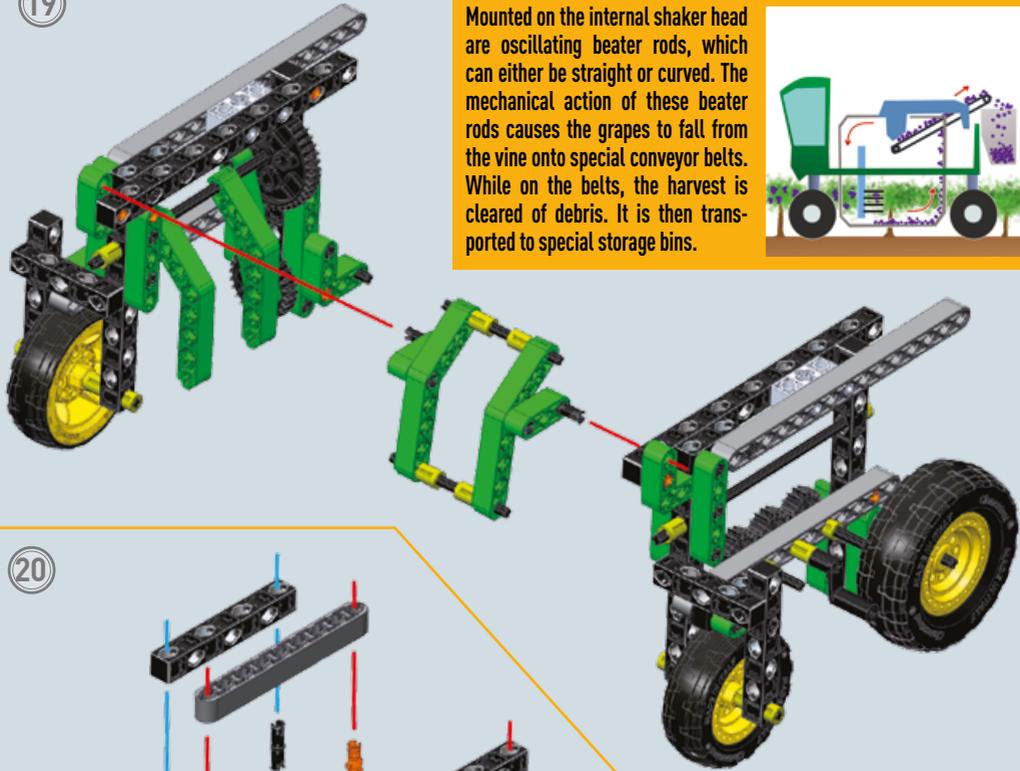
- X2 [Black Technic Pin]
- X2 [Black Technic Pin]
- X4 [Black Technic Pin]
- X4 [Black Technic Pin]
- X2 [Black Technic Pin]



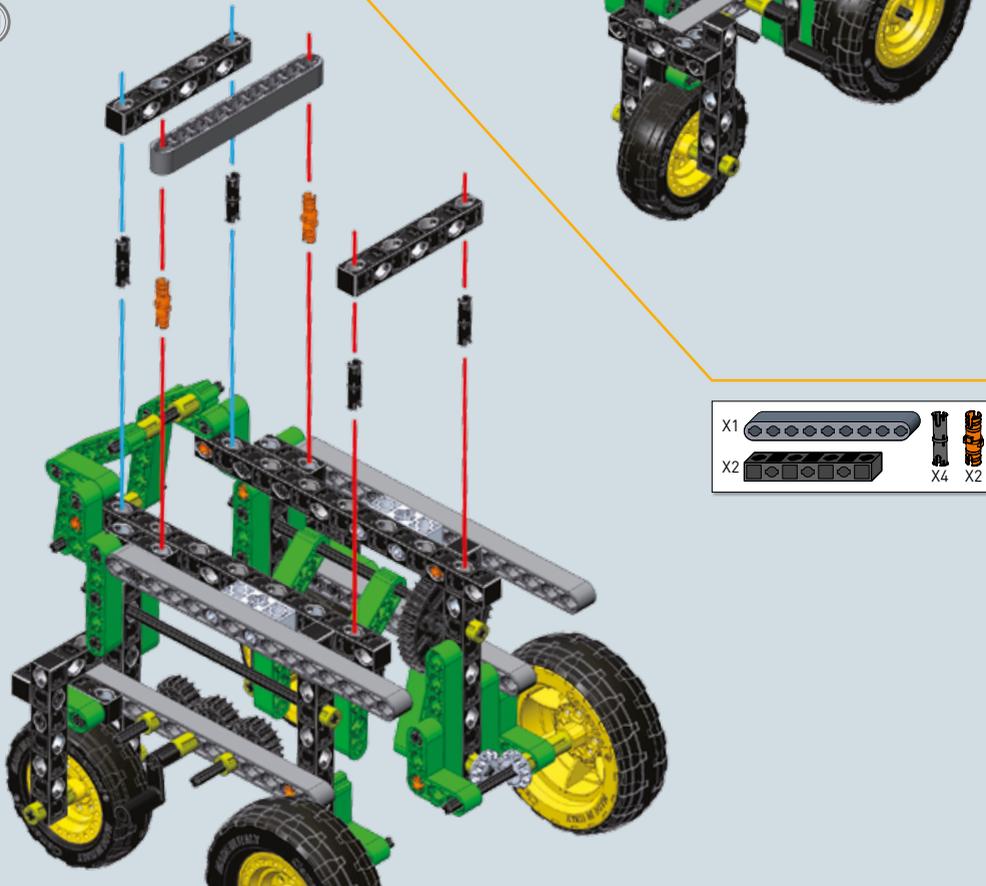
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Technical facts and curiosities

Mounted on the internal shaker head are oscillating beater rods, which can either be straight or curved. The mechanical action of these beater rods causes the grapes to fall from the vine onto special conveyor belts. While on the belts, the harvest is cleared of debris. It is then transported to special storage bins.



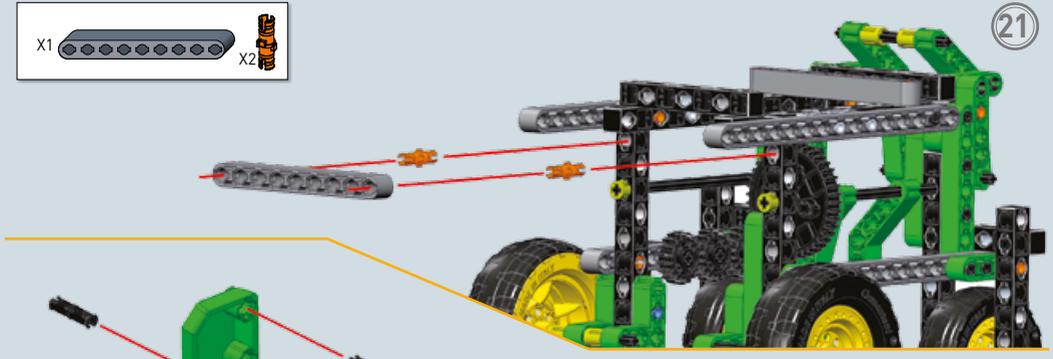
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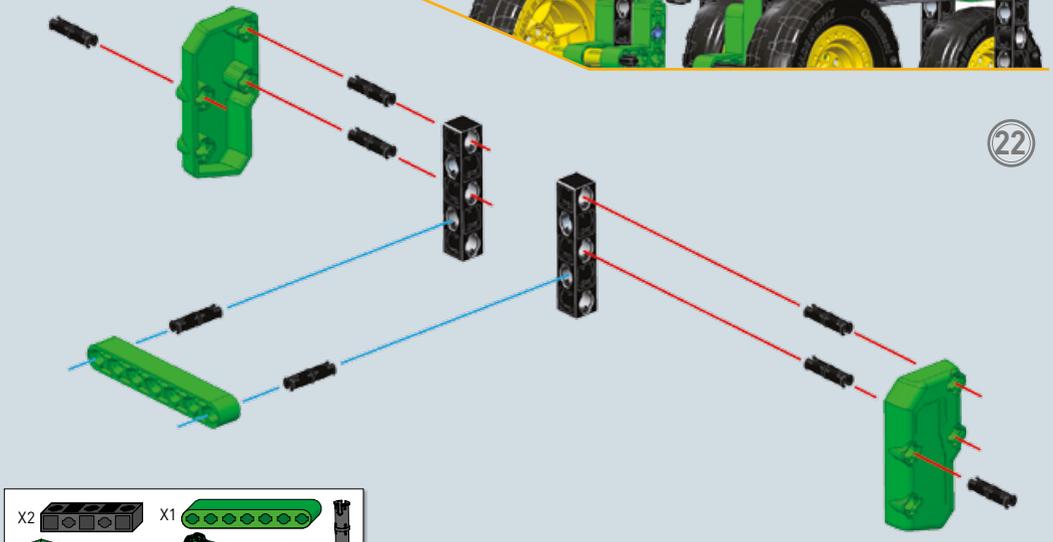
- X1
- X2
- X4
- X2

- X1
- X2

21

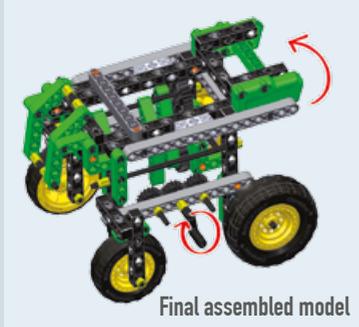
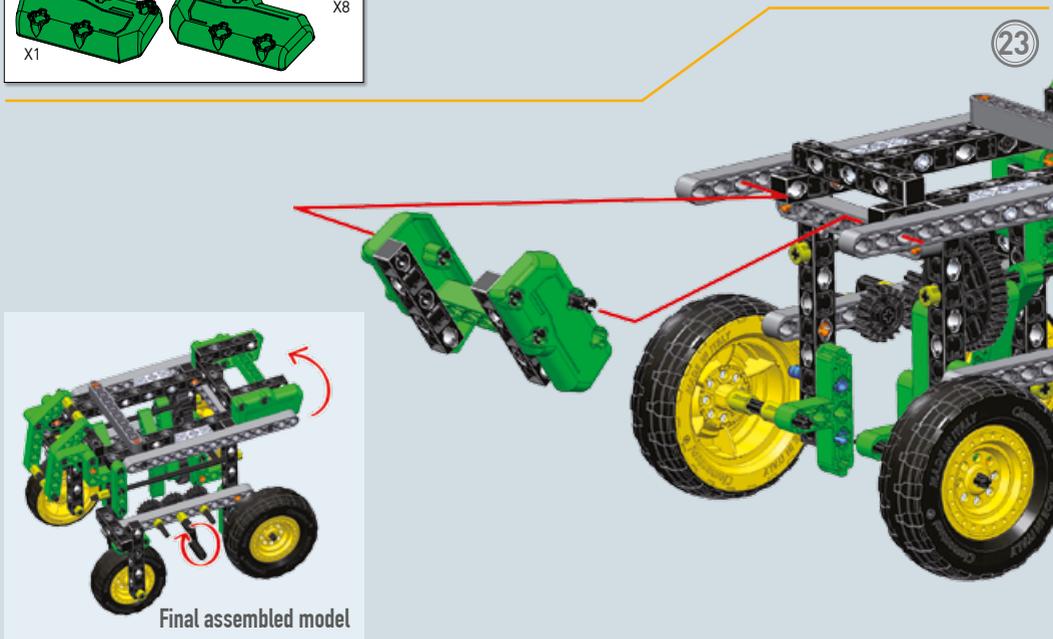


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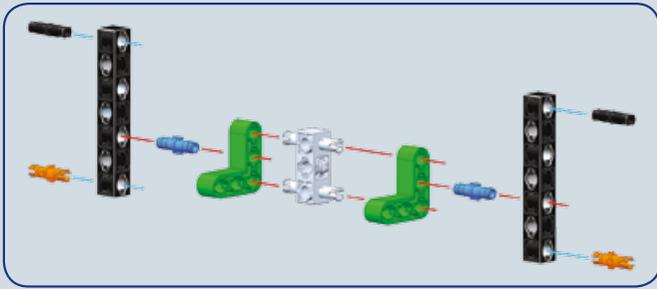


- X2
- X1
- X1
- X1
- X8

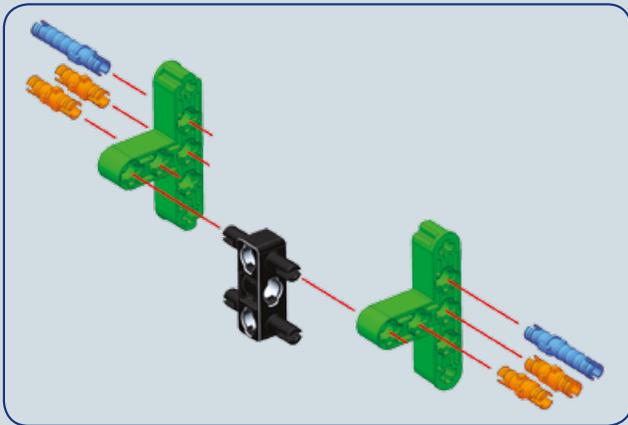
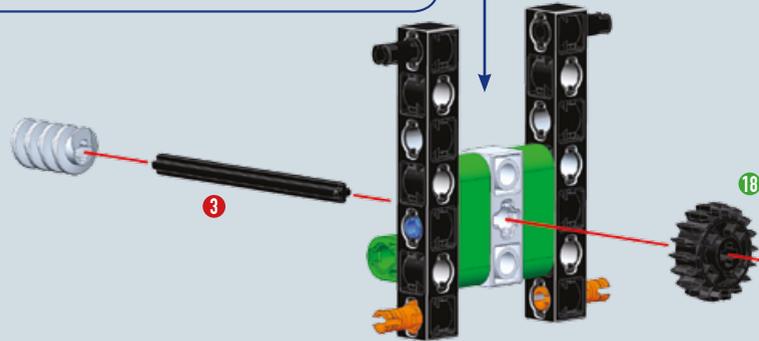
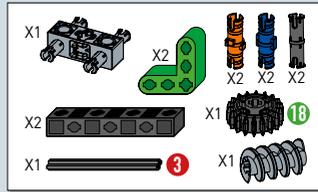
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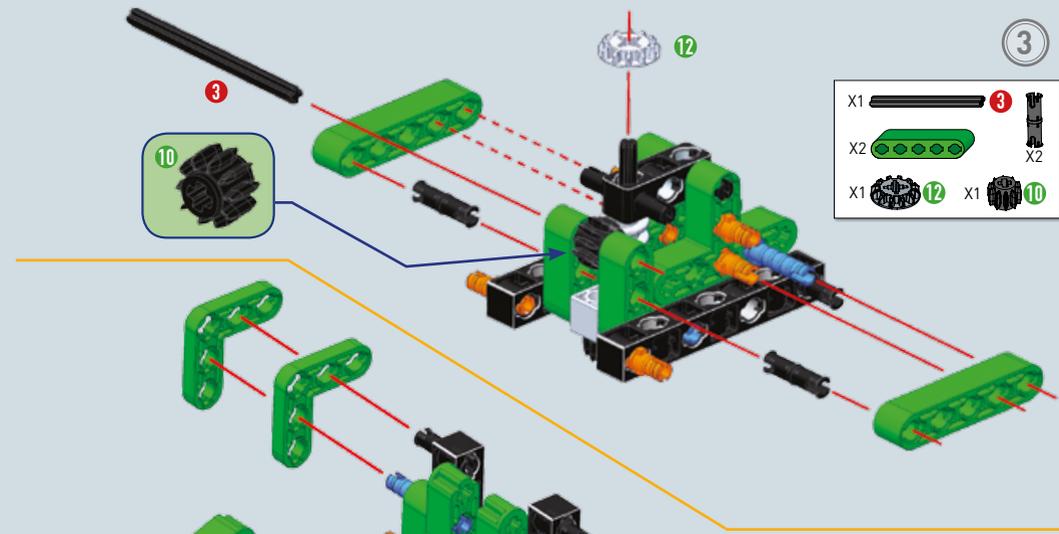
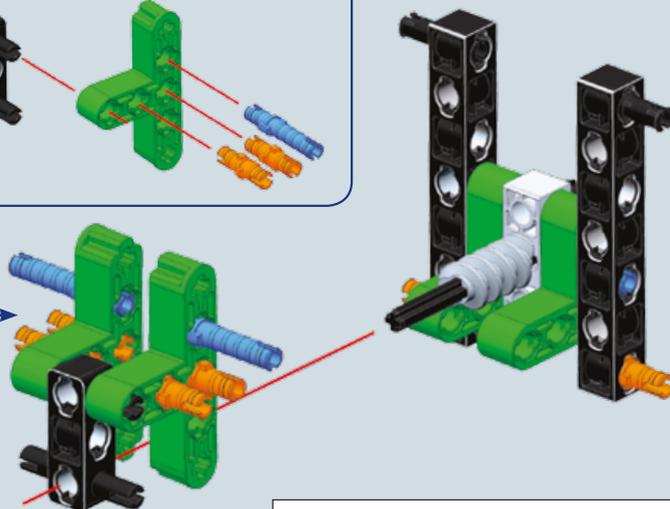
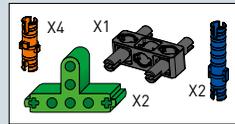
Final assembled model



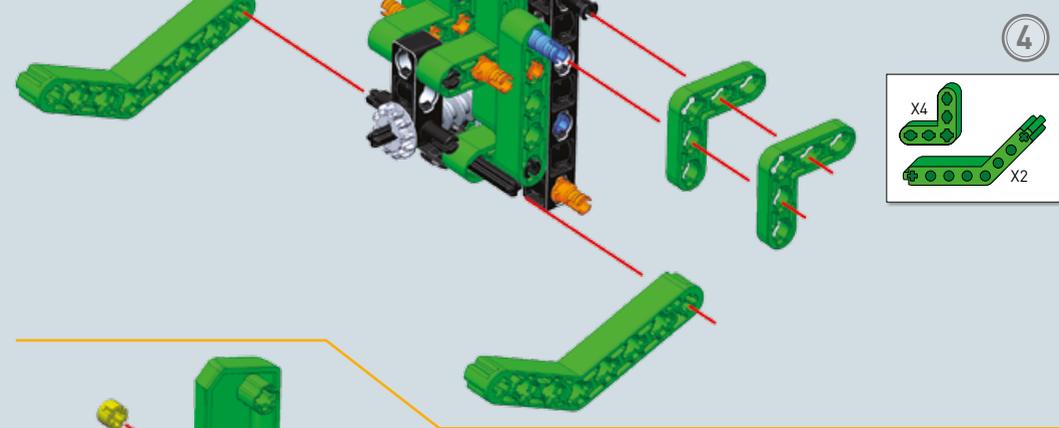
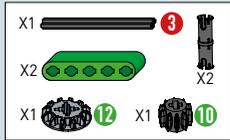
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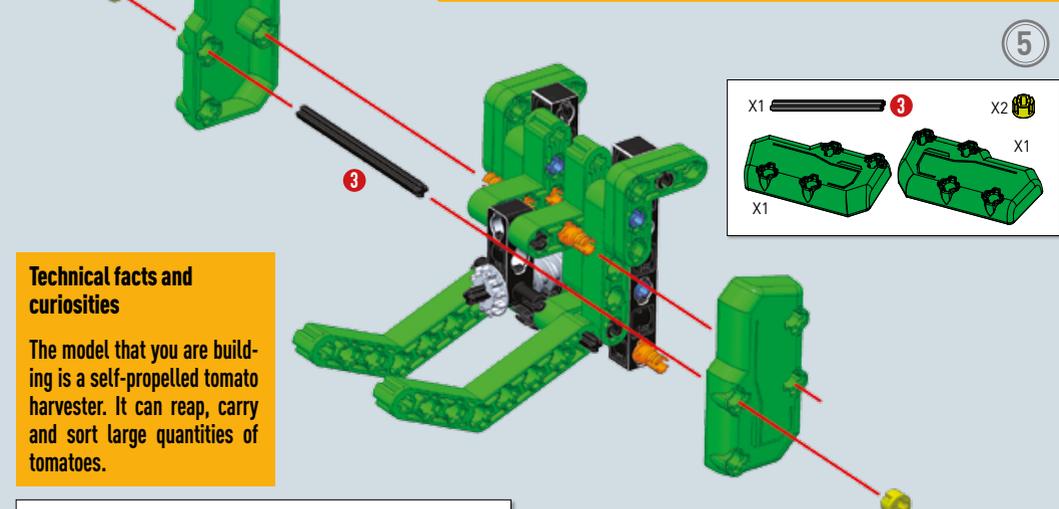
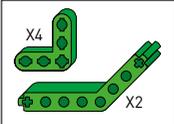
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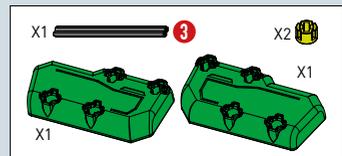
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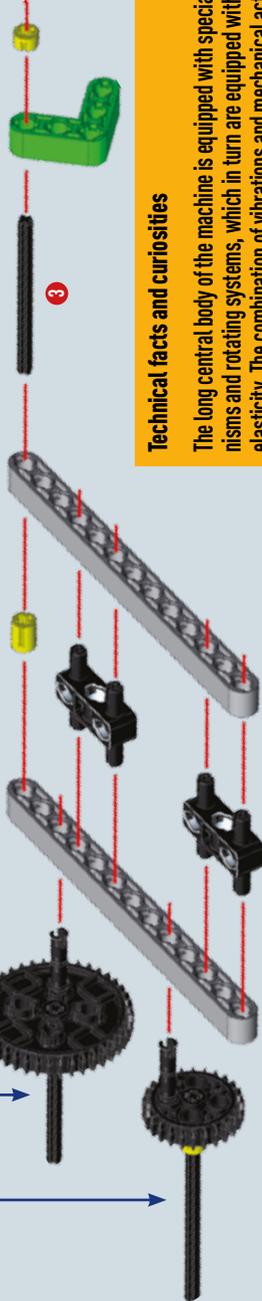
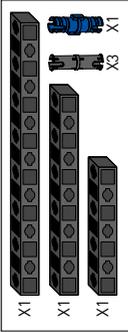
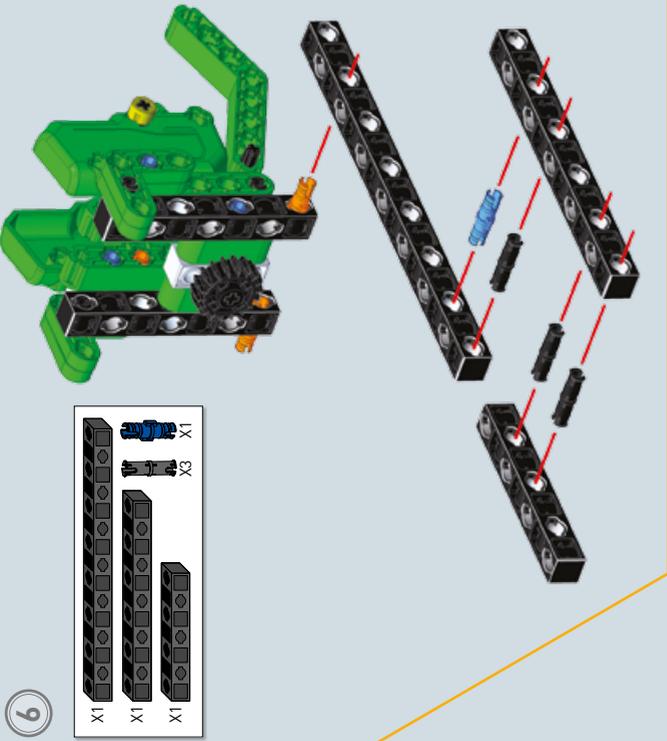
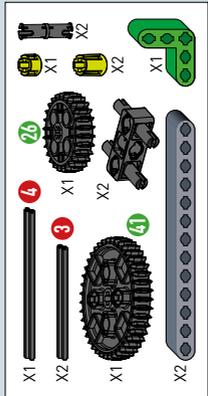
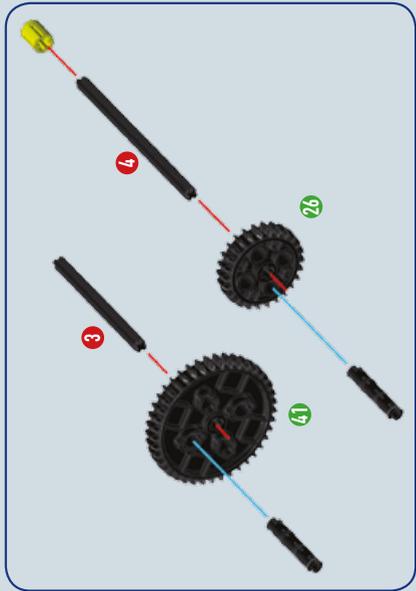


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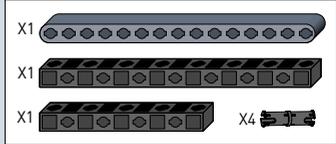
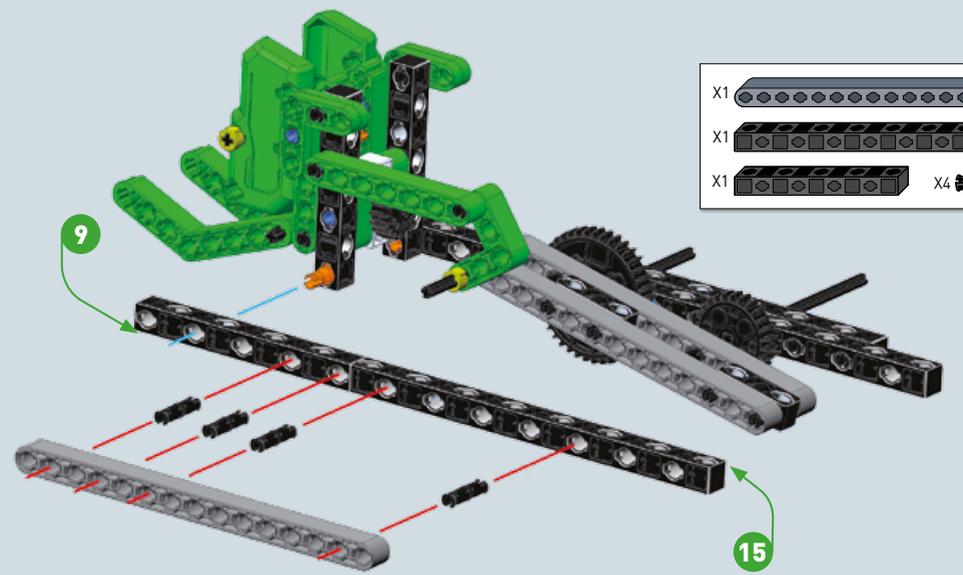
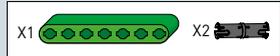
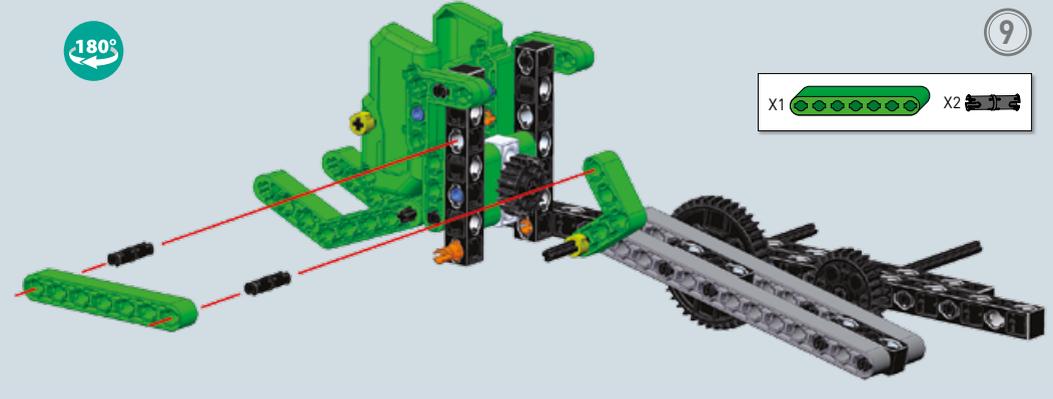
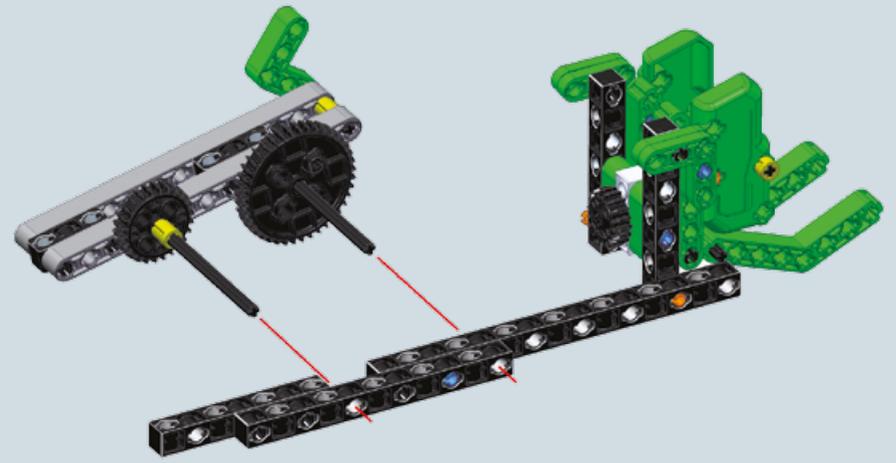
Technical facts and curiosities
 The model that you are building is a self-propelled tomato harvester. It can reap, carry and sort large quantities of tomatoes.

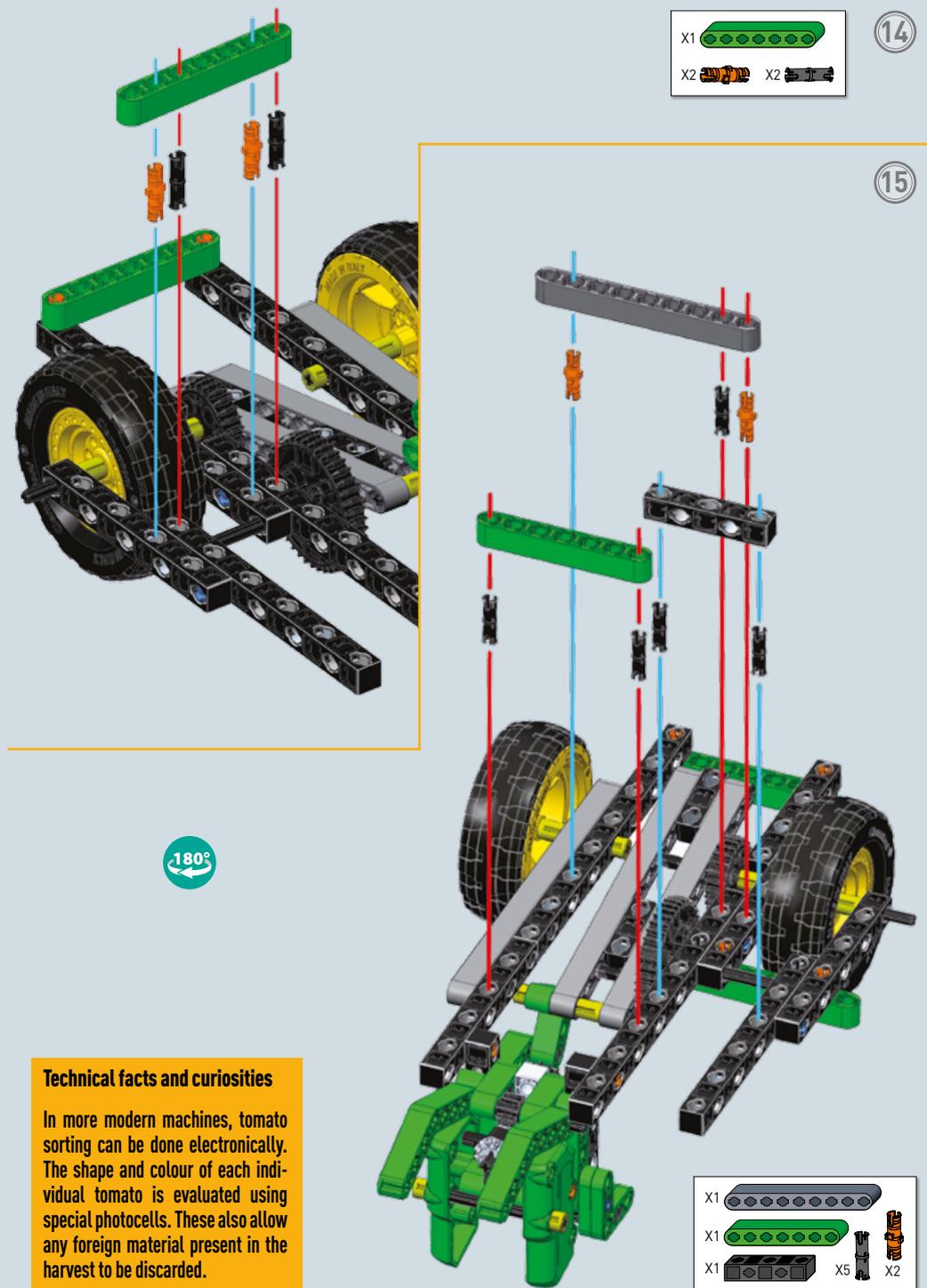
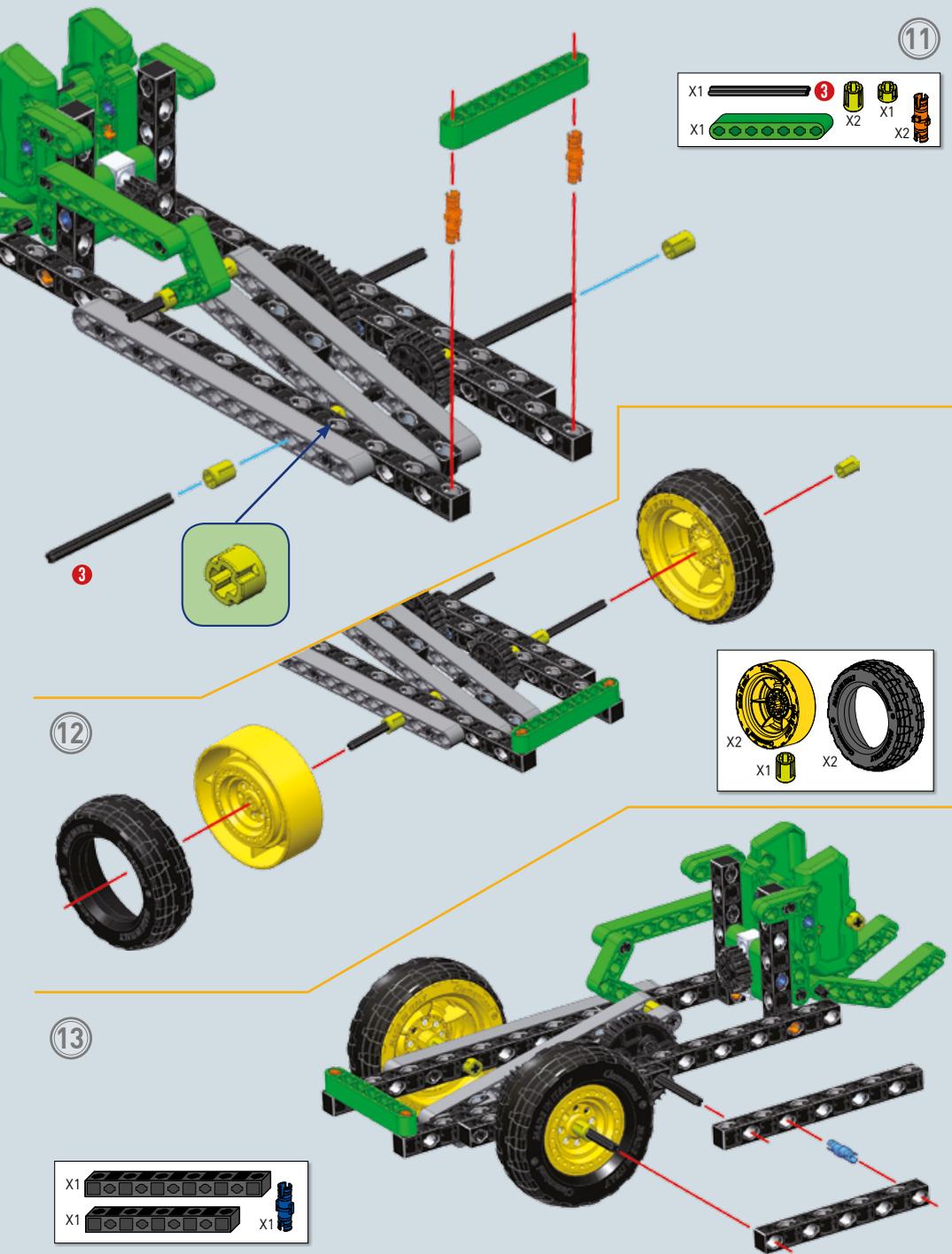




Technical facts and curiosities

The long central body of the machine is equipped with special vibrating mechanisms and rotating systems, which in turn are equipped with spokes of varying elasticity. The combination of vibrations and mechanical action means the soil can be removed and the stalks of the plant cut.



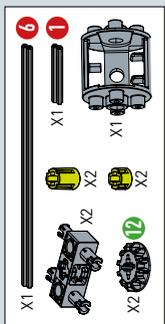
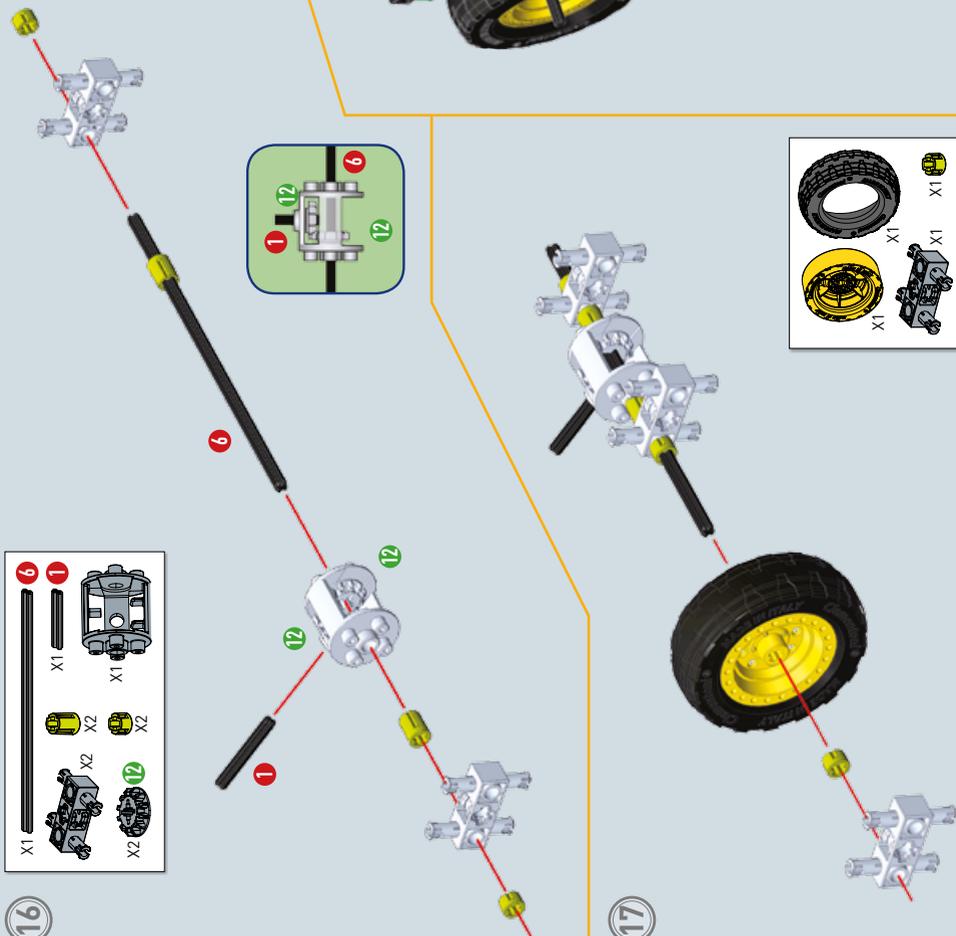
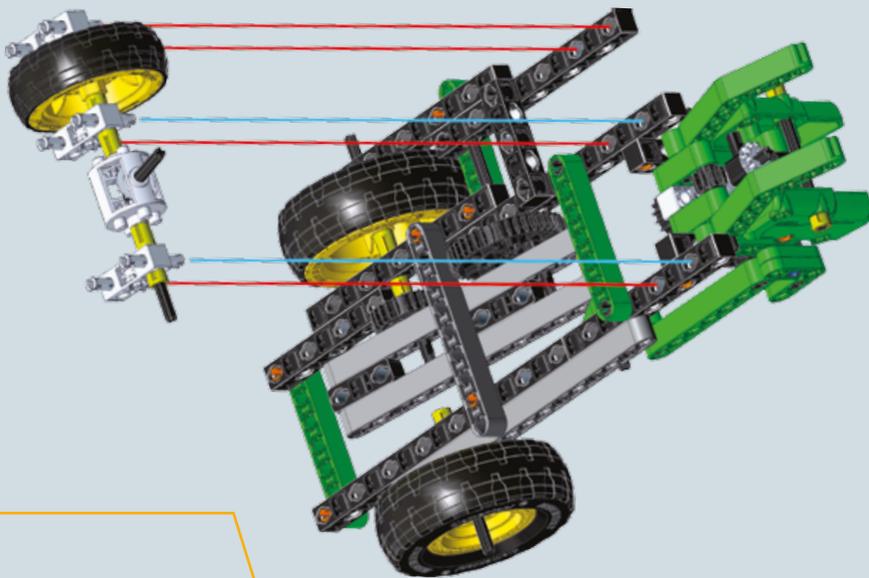


Technical facts and curiosities

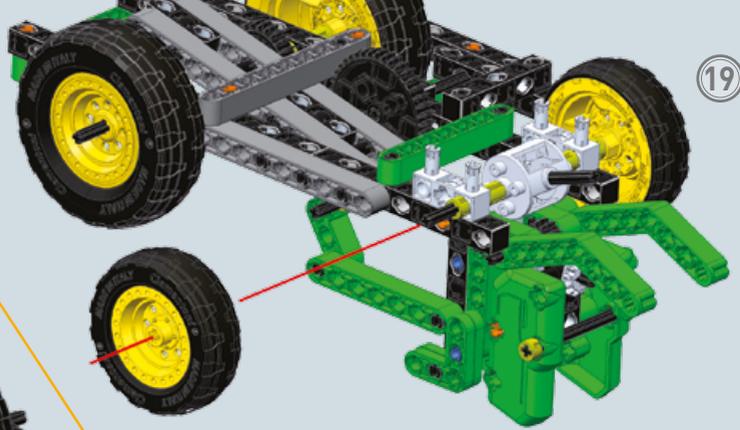
In more modern machines, tomato sorting can be done electronically. The shape and colour of each individual tomato is evaluated using special photocells. These also allow any foreign material present in the harvest to be discarded.



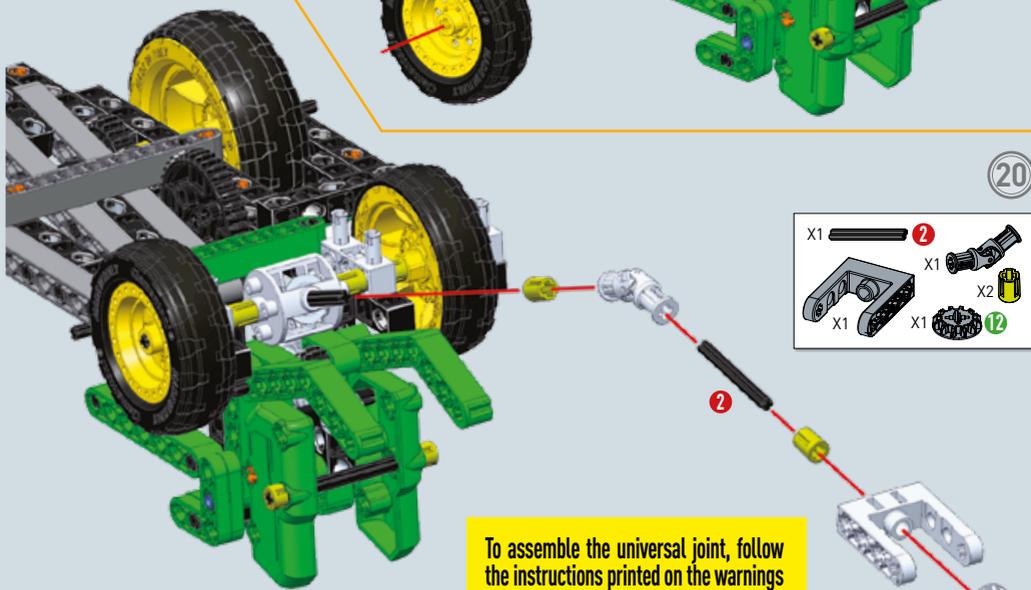
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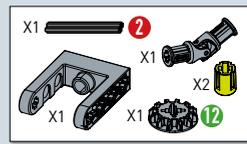
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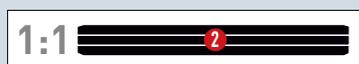
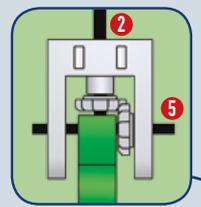
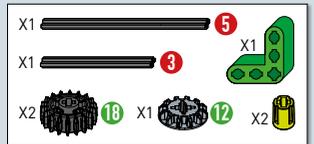
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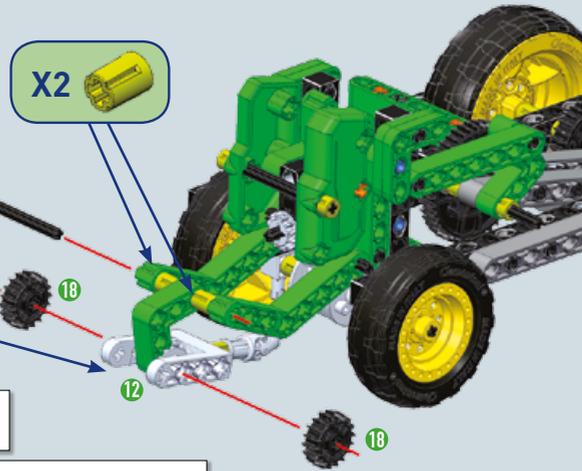
20



To assemble the universal joint, follow the instructions printed on the warnings leaflet, contained in the box.

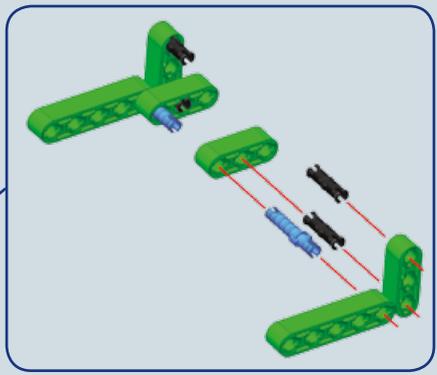
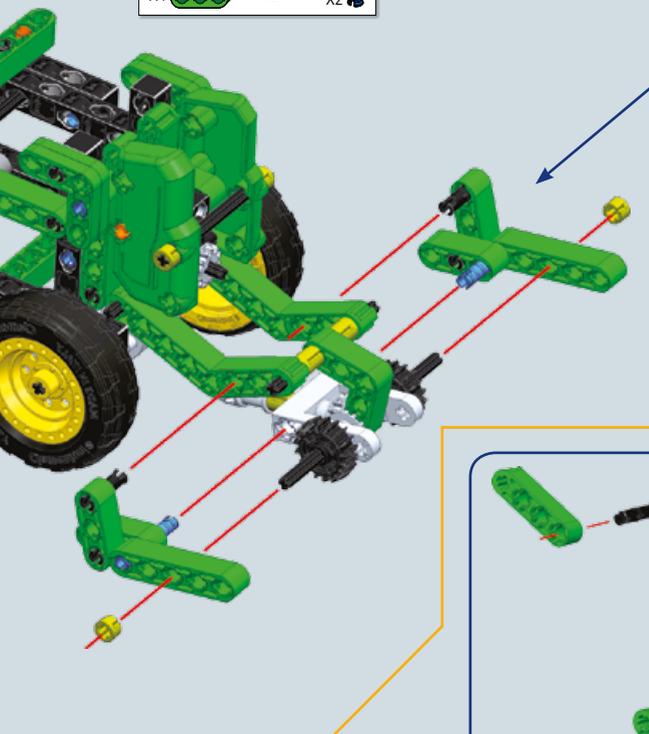


21



22

- X2
- X4
- X2
- X2
- X2
- X4
- X2



23

- X1
- X1
- X2
- X2
- X1
- X2
- X1
- X2
- X1

